LYNX Lymmo

Bus Rapid Transit Evaluation

Technical Memorandums One Through Three

Contract BC-137-17

Final Report

Prepared for the

Federal Transit Administration and Florida Department of Transportation

FTA

STATE OF FLORIDA • DEPARTMENT OF TRANSPORTATION

By the

National Bus Rapid Transit Institute

National BRT Institute

and the

National Center for Transit Research

NCTR at CUTR

JULY 2003

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16. Abstract

The objective of the evaluation was to document and assess the Lynx LYMMO Bus Rapid Transit (BRT) service in Downtown Orlando, Florida as one of the newest and innovative applications of BRT service in Florida and the US. In partnership with Lynx (transit operator), Florida Department of Transportation (FDOT), and the Federal Transit Administration (FTA), the National Bus Rapid Transit Institute (NBRTI) conducted an objective evaluation of the LYMMO BRT service. The final report contains a comprehensive profile of the LYMMO system from inception to operation including a historical narrative, engineering and construction, communications, and institutional documentation. In addition, the final report provides an evaluation of the performance of the LYMMO by identifying current performance strengths and weaknesses, customer satisfaction, effectiveness of technology in meeting original project goals, and the benefits of the LYMMO to the Downtown Orlando and Central Florida community. Finally, the report concludes with an overall assessment of the LYMMO's various technology applications, financial feasibility compared to alternate public transit modes considered for Downtown Orlando, the LYMMO's operational performance, and overall performance of the LYMMO in meeting the original goals of the project.

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Executive Summary
Evaluation of the Lynx LYMMO Bus Rapid Transit Project

Problem Statement and Objectives

The objective of the evaluation was to document and assess the LYMMO service as one of the newest and innovative applications of Bus Rapid Transit (BRT) service in the U.S. In partnership with Lynx (transit operator), Florida Department of Transportation (FDOT), and the Federal Transit Administration (FTA), the National Bus Rapid Transit Institute (NBRTI) conducted an objective evaluation of the LYMMO BRT service. The first task in the evaluation was to provide a comprehensive profile of the LYMMO system from inception to operation including a historical narrative, engineering and construction, communications, and institutional documentation. The second task was to provide an evaluation of the performance of the LYMMO by identifying current performance strengths and weaknesses, customer satisfaction, effectiveness of technology in meeting original project goals, and the benefits of the LYMMO to the Downtown Orlando and Central Florida community. Finally, the third task provided an assessment of the LYMMO's various technology applications, financial feasibility compared to alternate public transit modes considered for Downtown Orlando, the LYMMO's operational performance, and overall performance of the LYMMO in meeting the original goals of the project.

Project Background

In 1972, a special taxing district determined by a referendum for the purpose of encouraging redevelopment planning and programming was assigned to the Downtown Development Board (DDB). Into the early 1980s, Orlando continued to express interest in promoting downtown revitalization and determined it would be achieved by providing adequate infrastructure development, including parking. Understanding the importance of pedestrian accessibility and increased development capacity in order to encourage the occurrence of redevelopment in the centralized downtown core, the DDB and the Community Redevelopment Agency (CRA) emphasized the concept of perimeter parking. Once this idea was adopted, the need for a quick and reliable transportation alternative was eminent, resulting in the conception of the LYMMO Project. Prior to the arrival of the LYMMO's system design to downtown Orlando however, a series of other systems were tried.

Meter Eater, FreeBee, and OSCAR

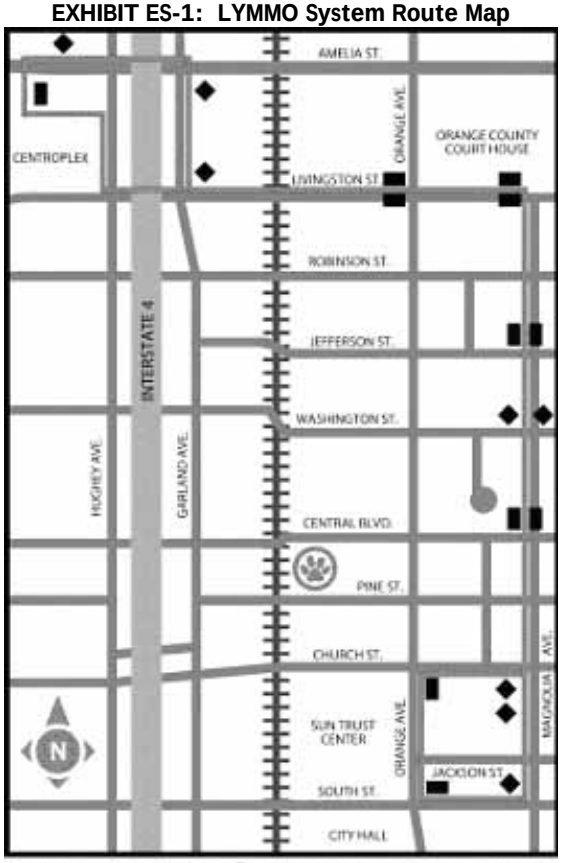
The Meter Eater service was the first circulator system used in downtown Orlando. Introduced to downtown in 1983, service was provided by trolleys and ran from parking garages located along the periphery to the center of the Central Business District (CBD) for $0.25. The community immediately accepted the system and encouraged enhancements to the project. In 1984, the Meter Eater system was sold and became the *FreeBee*. Service of the *FreeBee* had the same purpose, yet funding was provided through parking revenues generated by the city. The *FreeBee* added eight full-size buses, and as an effort to attract attention, painted them with Florida flora and fauna scenes. The system witnessed an increase in ridership over its years of service to 1,750 trips per day. The increase in ridership encouraged the city and Lynx to explore additional options. In 1989 the city purchased OSCAR, a vintage electric streetcar introduced for promotional purposes of the circulator project, which facilitated additional interest in providing an environmentally sound method to reduce traffic congestion and parking volumes. In 1994, after determining the route and transit technology, the decision was made to approve the LYMMO project and design of the project promptly ensued.

About the LYMMO System

The LYMMO system provides service on a north-south route connecting the Centrolplex Garage at the Orlando Arena to City Hall located in the center of downtown. The route is a three-mile loop on which ten buses provide very frequent service during the day and about every ten minutes in the evening. In traveling the route, buses serve eleven stations and eight stops, resulting in a total travel time of eighteen to twenty minutes. A route map is shown in Exhibit ES-1.

LYMMO uses state of the art technology to enhance service. The Intelligent Transportation Systems used on the LYMMO are dedicated lanes, an advanced computer monitoring system, and a multi-modal center. The system uses audio/visual-tracking information, located on the computerized kiosks that provide real-time bus information. All of the vehicles are installed with a tracking-system in order to be able to determine exact location, destination and estimated arrival times. There is also a transponder and sensor system in place to synchronize and control traffic signals and allow for light prioritization. The multi-modal center is part of the future plans to interphase with light rail transit and inter-city transit. The goal is to maximize the transfer opportunities between LYMMO and Lynx. Although LYMMO does not provide direct access to the Lynx transfer facility, transfer opportunities do exist for most downtown Lynx bus routes.

EXHIBIT ES-1: LYMMO System Route Map



Funding and Project Costs

The LYMMO is a $21 million project funded jointly by the Federal Transit Administration (FTA), city of Orlando Downtown Development Board (DDB), the Central Florida Regional Transportation Authority (Lynx), Community Redevelopment Agency (CRA) and the city parking system. Initial project funding was provided in the amount of $5 million dollars from the FTA in response to grant submissions prepared by the client and project manager. Once cost estimates were determined and preliminary project information was available, final project funding contribution was distributed in the following manner:

- FTA – 50 percent - $10.5 million
- FDOT – 25 percent - $5.25 million
- Local Match – 25 percent - $5.25 million

The source of funding of the FTA was under the authorization of the "New Starts" program, which provides money for transit systems within the country. FDOT's Transit Capital Program was slotted as the revenue source for its contribution.

The City of Orlando, responsible for the management of construction and fund operations and maintenance, headed an operations agreement under which Lynx worked. The revenue source for the funding of operations and maintenance was the Parking Enterprise Fund that was associated with downtown parking facilities and the *FreeBee* circulator service that was running when funding allotment was determined.

The following sections detail the major tasks and findings from the LYMMO BRT evaluation.

On-Board Survey of LYMMO Customers

In keeping with the FTA's evaluation guidelines, the Center for Urban Transportation Research (CUTR), working jointly with Lynx, conducted an on-board survey of LYMMO customers in December 2001. Examination of the various components of the LYMMO is a critical part of the evaluation of the LYMMO demonstration project. The on-board survey was conducted to assess customer perceptions, behavior, and profiles and to determine the many reasons that persons elect to use the LYMMO BRT service such as faster travel time, ease of use, and vehicle and station features. The on-board survey asked customers to evaluate various elements of service as well as overall satisfaction, with the ultimate purpose of measuring the impacts of the LYMMO on customer perceptions. Specific questions focused on customer behavior, including trip origins and destinations, frequency of LYMMO use, and why customers elected to use the LYMMO BRT service. Questions also obtained information about the riding experiences of customers with the LYMMO. Due to the short time that customers are actually on board LYMMO vehicles while making trips (usually just one or two stops taking no longer than 1-2 minutes to complete the trip), standard demographic questions such as those inquiring about age, income, and ethnicity were omitted from the survey instrument. The intent behind omitting these and other standard on-board survey questions was to shorten the survey as much as possible with the hope of increasing the overall response rate and obtaining completed surveys.

The LYMMO BRT system operates on a continuous loop through Downtown Orlando using a combination of the various types of dedicated BRT travel ways including median and same-side travel way configurations. In some instances, the travel ways are colored gray to denote to vehicular traffic that the lanes are only for the LYMMO vehicles. In addition to the dedicated travel ways, the LYMMO also operates in mixed traffic for a portion of the route in Downtown

Orlando. The LYMMO uses 10 low-floor vehicles fueled by environmentally friendly compressed natural gas. The vehicles use high-quality interiors that incorporate an ITS system known as Transit TV Network. The Transit TV Network provides real-time information such as Downtown events, weather, and fun and trivia to customers. In addition, public-art exteriors are used on the vehicles to enhance the customer's experience with the LYMMO. The LYMMO system has 11 lighted and computerized stations and 8 additional stops.

The LYMMO vehicles operate approximately every 5 minutes during office hours, and after office hours, vehicles operate approximately every 10 minutes. Since the inception of service, the LYMMO has been free to ride during all hours of operation. The LYMMO operates from 6 AM to 10 PM, Monday through Thursday, 6 AM to Midnight on Friday, 10 AM to Midnight on Saturday, and 10 AM to 10 PM on Sunday.

Major findings from the on-board survey of LYMMO customers include:

- Regarding trip purpose of LYMMO customers, the majority uses the system to get to their jobs and for lunch, shopping, and errands while in Downtown Orlando.

- The results indicated that the primary origins and destinations of LYMMO customers are the Centroplex Parking Garage, Courthouse, Church Street, Library, Lake Eola Park, Bob Carr Auditorium, SunTrust Bank, and Bank of America.

- Just fewer than 41 percent of customers use the LYMMO 2 or 3 times per day and make an average of 2.45 trips per day on the LYMMO.

- Just fewer than 42 percent of customers indicated that they would like the LYMMO to remain free of charge to ride.

- Most customers indicated they are only willing to pay $0.25 to use the LYMMO.

- The results indicated that 54.3 percent of LYMMO customers currently do not use any other Lynx services other than the LYMMO.

- The electronic information displays (shown in Exhibit ES-2) are either underutilized or never used by LYMMO customers, with almost 78 percent of customers sometimes or never using the electronic displays at stations.

- The results indicated that 82.2 percent of LYMMO customers find the Transit TV Network on-board video displays useful and entertaining.

EXHIBIT ES-2: Station Kiosk

- Customers rate the low-floor vehicles, vehicle interiors, and electronic information at stations as their three favorite features of the LYMMO.

- The results show that 27 percent of the respondents elected to use the LYMMO because it is faster than walking in the Downtown Orlando area. Additionally, 16.4 percent elected to use the LYMMO because it is free to ride, and an additional 14.4 percent elected to use the service because they feel it is easy to use.

- The results indicated that 52.5 percent of LYMMO customers have improved their opinions of public transit as a result of using the LYMMO service.

- Customers indicated a very high level of satisfaction with overall LYMMO service; all mean satisfaction scores were about 4.41 on a 5.0 scale, falling between "satisfied" and "very satisfied," including the service elements of travel time and reliability.

- An analysis of the very high customer mean scores and importance of the service attributes clearly shows that LYMMO users regard the LYYMO BRT as a premium service. In short, Lynx

has essentially raised the bar in terms of service quality for its customers through the LYMMO BRT service.

- All of the LYMMO service characteristics inquired about on the survey received an 88 percent or higher "satisfied" and "very satisfied" rating.

- Based on a STEPWISE regression analysis, the most important service characteristic to LYMMO customers was "comfort of the LYMMO vehicles," accounting for 56.3 percent of overall customer satisfaction. This result is not surprising given the results for Question 7 in which LYMMO customers indicated that they liked the low-floor vehicles and vehicle interiors the most, each of these an important "comfort" element and aspect of BRT service.

- The second service characteristic to enter the regression equation was "travel time on LYMMO vehicles." The entry of "travel time" into the regression equation increased its overall predictive power to 65.6 percent, a significant increase in the predictive power of overall LYMMO customer satisfaction.

- In comparison to previous on-board surveys of the customers of all Lynx services (including the LYMMO) for the years 1995, 1998, and 2001, the data show that current LYMMO customers are significantly more satisfied with reliability of service and overall safety compared to that of other Lynx services for these years.

Focus Groups

Because there were only a small number of participants in the two focus groups, it is difficult to extrapolate participant opinions to those of the general public. However, because the group participants are considered to be community leaders involved with a variety of committees and organizations that are concentrated on planning and development issues, their opinions have been formed not only by personal experience but by the tone and attitude of the Orlando community as well. Therefore, their contributions are considered valuable because they, in some sense, speak for the community.

The divisions between the two groups illustrate the political aspects of transportation decision-making. Participants were not recruited for one or another group based on their community or organizational affiliations; they were given their choice of meeting times. Although there were varying opinions offered during the two focus group discussions, there was overall consensus on the following points:

- The current LYMMO route should be expanded to serve new areas of Downtown commercial and residential development.

- Although there were strong promotional campaigns when the service began, LYMMO is currently suffering from a lack of aggressive marketing and requires ongoing promotion and education.

- Efforts to increase ridership should be expanded.

- The LYMMO service should remain free of charge to passengers.

- LYMMO drivers are friendly and courteous.

- Vehicle interiors are comfortable and well maintained.

- Although many of the vehicle exteriors are attractive, they could be designed better and maintained more regularly.

- Vehicles, stations, and stops are distinct from other Lynx services.
- If it is accurate, the electronic information is appreciated and valuable.

- LYMMO contributes to the overall transit environment of Orlando and will be important to its future.

Participants widely agree that LYMMO is a good idea for Downtown Orlando, but that it requires ongoing assessment regarding its effectiveness and its usefulness to the area. As Downtown continues to develop and change, participants believe that transit services, including the LYMMO, must be responsive to those changes if the needs of this rapidly expanding metropolitan region are to be served.

Findings and Conclusions

Based on the evaluation, it was determined that the Lynx LYMMO BRT project has been successful at meeting all six of its original goals and objectives as follows:

Goal 1: Reduce congestion (i.e., vehicular trips) in downtown core

Goal 2: Lessen demand for parking in downtown core

Goal 3: Encourage more transit use and pedestrians in downtown

Goal 4: Increase mobility and accessibility to major downtown destinations

Goal 5: Enhance quality and public perception of Downtown Orlando

Goal 6: Allow for additional downtown development capacity

This research project resulted in detailing the specific components of the LYMMO BRT system that contributed to its overall success and the ones that are the most likely to lead to or enhance the success of other BRT systems in the U.S., if implemented. The key components are: simple route structure, frequent service, headway-based schedule, less frequent stops, level customer boarding and alighting, exclusive bus-only lanes/right-of-way, multiple door boarding and alighting, coordinated land-use planning, enhanced bus stations, clean fuel vehicles (CNG), low-floor vehicles (35-foot New Flyer), Passenger Advisory System/Automated Vehicle Location, Transit TV Network, passenger information kiosks at stations, extensive street-scaping and beautification of route, marketing and promotional materials, and community involvement in planning and development.

The objectives of the FTA's BRT Demonstration Program are as follows:

- Improve bus speeds and schedule adherence;
- Increase ridership as a result of improved bus speeds, schedule adherence, and convenience;
- Minimize the effect of BRT on other traffic;
- Isolate the effect of each BRT feature on bus speed and other traffic; and
- Assess the effect of BRT on land use and development.

With regard to advanced technologies and other BRT features, the following results from the evaluation are related to FTA's Demonstration Program objectives:

Objective 1: Improve bus speeds and schedule adherence

- LYMMO bus speeds have not improved compared to the *FreeBee* as a result of the use of the various APTS technologies used as part of the system. Currently, the LYMMO's average weekday speed is approximately 9.0 miles per hour vs. 9.9 miles per hour for the *FreeBee* (LYMMO average speed was calculated by dividing the 3.0 route miles by a 20 minute round time). However, without the use of the various APTS technologies the LYMMO would be considerably slower than its current average speed of 9.0 miles per hour due to increased ridership (more dwell time at stations and stops), increased number of stations/stops, and having to stop at every station regardless of whether a customer has signaled the bus to stop or not compared to the *FreeBee*.

- Results from the on-board survey conducted as part of this evaluation show that LYMMO schedule adherence (reduced LYMMO vehicle bunching) has improved as a result of the Passenger Advisory System (PAS)/Automated Vehicle Location (AVL) system. LYMMO staff is able to monitor the precise location of vehicles to reduce bunching and better respond to on-street demand.

- The LYMMO's exclusive bus-only right-of-way contributes to the customer's "perception" of improved bus speeds (reduction in travel time).

Objective 2: Increased ridership as a result of improved bus speeds, schedule adherence, and convenience

- LYMMO ridership has remained steady at about 5,000 average weekday riders despite not improving bus speeds. According to the City of Orlando, average vehicle occupancy in the Downtown is 1.2 persons per vehicle. The average weekday ridership of 5,000 LYMMO person trips would convert to 4,166 daily vehicle trips, which is a portion of the daily traffic presumably reduced by the LYMMO.

- LYMMO vehicles operate using a demand-based headway schedule with very frequent service (short time between buses). Since the implementation of the PAS/AVL system, Lynx has been able to monitor the position of LYMMO buses in real-time to eliminate bunching as much as possible and respond to increased demand.

- Ridership has remained steady due to the convenience of the LYMMO in the downtown core. The LYMMO provides an excellent alternative to trips made in the downtown core by private automobile and even walking. The LYMMO route either directly serves or is in very close

proximity to many of the major destinations in the downtown core including government facilities, banks, and restaurants. The LYMMO meets this objective by providing downtown employees and visitors with a unique transit service that can be used for daily internal downtown trips.

Objective 3: Minimize the effect of BRT on other traffic

- As noted above in Objective 2, LYMMO ridership has remained steady at about 5,000 average weekday riders. According to the City of Orlando, average vehicle occupancy in Downtown Orlando is 1.2 persons per vehicle. The average weekday ridership of 5,000 LYMMO person trips would convert to 4,166 daily vehicle trips, which is daily traffic presumably reduced by the LYMMO. Given this, the LYMMO has had a positive effect on other traffic by removing a portion of the almost 4,200 daily vehicle trips from Downtown Orlando.

- The exclusive bus-only right-of-way and bus signal phasing system have minimized the effect of the LYMMO on cross-street traffic and other general vehicular traffic in the downtown core. According to the City of Orlando, this is partially due to good traffic signal timing and traffic being evenly distributed over the Downtown's network of grid streets.

Objective 4: Isolate the effect of each BRT feature on bus speed and other traffic

- Despite exclusive bus-only lanes and signal pre-emption (APTS system), average speeds are somewhat lower for the LYMMO than its predecessor the *FreeBee*. One possible explanation is that LYMMO buses stop at each station, whether a customer has signaled the bus to stop or not. Another possibility is that the increase in ridership between the *FreeBee* and LYMMO has resulted in more dwell time while customers are boarding, despite the low floor vehicles and the absence of fare collection time and shorter route compared to the *FreeBee*.

- The PSA/AVL APTS system used as part of the LYMMO has had a positive effect on station dwell time since Lynx operations is able to use it to adjust LYMMO bus spacing to more evenly distribute headways.

- The new APTS information kiosks located at stations provide information to waiting customers via the PSA/AVL system about next bus arrival and the actual location of buses along the entire LYMMO route, thus reducing customer anxiety associated with waiting for the bus. In addition, the Transit TV Network terminals located inside every LYMMO bus

provide customers with real-time information about the LYMMO and other items such as current events in the Downtown, weather, and local news.

Objective 5: Assess the effect of BRT on land use and development.

- Since implementation of the LYMMO, Downtown Orlando has experienced significant population and employment growth. As development in urban areas intensifies, vehicular traffic congestion will naturally occur which the LYMMO can help alleviate. While the goal of reducing congestion may have been stated in the LYMMO planning documentation, the City's emphasis has been progressively clarified to provide convenient and reliable transportation choices (the LYMMO) while responsibly accommodating growth demands.

Transferability of Results and Recommendations

The BRT components that contributed to the success of the LYMMO and are most likely to succeed in other localities are bulleted below. In addition, the LYMMO's key BRT attributes (based on FTA documents of review of other BRT systems) are shown in Table ES-1.

- Simple route structure
- Frequent service
- Headway-based schedule
- Less frequent stops (although more than *FreeBee*)
- Level customer boarding and alighting
- Public art vehicles
- Bus-only signal phasing
- Exclusive bus-only lanes/right-of-way
- High-capacity buses
- Multiple door boarding and alighting
- Coordinated land-use planning
- No fare to ride
- Enhanced bus stations
- Clean fuel vehicles (compressed natural gas or CNG)
- Low-floor vehicles
- Passenger Advisory System/Automated Vehicle Location
- Transit TV Network
- Passenger information kiosks at stations

- Arrival time of next bus
- Extensive street-scaping and beautification of route
- Peripheral parking
- Marketing and promotional materials
- Community involvement in planning and development

Table ES-1: Key Bus Rapid Transit Elements of the LYMMO

Key BRT Attributes	LYMMO	
	Yes	No
Simple Route Structure	Y	
Frequent Service	Y	
Headway-based Schedules	Y	
Less Frequent Stops	Y	
Level Boarding and Alighting	Y	
Color-Coded Buses		Y
Color-Coded Stations/Stops	Y	
Bus Signal Priority	Y	
Exclusive Lanes	Y	
Higher-Capacity Buses		Y
Multiple Door Boarding and Alighting	Y	
Off-Vehicle Fare Payment	n/a	
Feeder Network		Y
ITS/APTS	Y	
Coordinated Land Use Planning	Y	

The LYMMO has had considerable success since its inception. But to avoid success being its undoing, system partners need to continue working together to better manage service, improve the consistency of the service, and look for ways to improve the customers' overall riding experience. Based on results from the three technical memorandums, a number of recommendations are provided for continual improvement to LYMMO service as follows:

- The City of Orlando and Lynx should continue to build upon the success of the LYMMO by working with other cities and municipalities in Lynx's tri-county service area to implement LYMMO-BRT type services where applicable.

- Given the current frequency levels and customer loads on the LYMMO, continue to offer the same or better headway-based schedule at specified days and times and continue the use of smaller buses (35-foot New Flyer) until demand dictates larger capacity buses.

- Continue to adjust scheduled frequencies using the PAS/AVL system to reflect current conditions (i.e., maintain even vehicle spacing and respond to unusually high customer demand). Even vehicle spacing is very important under most service conditions. However, during extreme conditions with headways under 5 minutes, the need to evenly space vehicles is unnecessary from a customer standpoint. The critical element during these conditions is to eliminate wide gaps in services and to provide adequate capacity so that there are no customer pass-bys.

- Explore ways to better connect the LYMMO to the rest of the Lynx system.

- Continue to promote the LYMMO as a viable transportation alternative that improves traffic congestion, air quality, and saves time through marketing information.

- Explore the use of new advanced technologies, such as the reimplementation of the traffic signal priority system, to improve the average speed of LYMMO vehicles while minimizing the impact on cross-street traffic.

- The DDB and City of Orlando should continue to use the LYMMO as a tool to build positive relationships with local businesses and other employers to attract additional work trip and lunchtime patrons.

- The City of Orlando, the DDB, and Lynx should work cooperatively to implement an east-west LYMMO line centrally located to the dowtown core business area. This service improvement should be implemented when then appropriate mix of land-uses, densities, and financial commitment are in place.

- The City of Orlando and Lynx should continue to seek customer input so that they can better understand their changing needs and can offer effective system improvements to meet needs.

- The City of Orlando and Lynx should continue to coordinate with the various jurisdictions to maintain an understanding of their vision for transit in their communities.

Data Availability

The most important aspect of a proper evaluation is the availability and reliability of data. While staffs from Lynx, the City of Orlando, and the DDB were helpful in providing assistance and much of the data during the evaluation of the Lynx LYMMO BRT system, it became apparent during the evaluation process that historical and performance related data were not always available and, when available, were not in sufficient detail. This data "gap" caused many of the tasks of the LYMMO evaluation to be more subjective than objective in nature than originally scoped. While historical data were available related to the construction of the project, data were not systematically collected since service inception to be able to compare before and after performance characteristics of the previous downtown circulator (*FreeBee*) with the LYMMO BRT system. One valuable lesson learned from the LYMMO BRT evaluation is that as the FTA moves forward with funding for the planning, construction, and operation of BRT systems, specifically among the BRT Consortium members, the evaluation of the LYMMO BRT system has shown the critical need for data collection to begin immediately and systematically in order to allow for a detailed evaluation of the effectiveness of specific BRT components and the effectiveness of the overall BRT system.

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List of Exhibits

Introduction

One of the main goals of the Federal Transit Administration's (FTA) Bus Rapid Transit (BRT) Demonstration Program is to determine the effects of BRT demonstration projects through a detailed evaluation process. While not one of FTA's ten designated BRT demonstration projects, the LYMMO was chosen by the FTA for evaluation due to its Intelligent Transportation Systems (ITS) and as a model for the implementation of similar BRT systems. According to the FTA, it believes that only by carefully documenting and analyzing the effects of the BRT projects and unique features of each that it will be possible to determine which features are most effective in certain contexts such as the type of service offered, the level of transit demand, the size of the region, passenger amenities used, ITS, and other characteristics to ultimately increase the usage of public transport. The FTA believes that various BRT projects will serve as learning tools and models for other locales throughout the country, and possibly the world. In order for these BRT projects to have maximum effectiveness in their respective operational capacities, the FTA believes that a consistent and carefully structured approach to project evaluation is necessary.

In addition, the FTA wants to examine specific impacts of various BRT projects. These impacts include the degree to which bus speeds and schedule adherence improve; the degree to which ridership increases due to improved bus speeds (the linchpin of BRT operation), schedule adherence, and convenience; the effect on other traffic; the effect of each of the components of BRT on bus speed and other traffic; the benefits of ITS/APTS applications to BRT project; and the effect of BRT on land use and development. In order to meet these objectives, the FTA understands that it will be necessary to collect a variety of different types of data on several aspects of BRT projects, including measurable impacts to BRT customers via a comprehensive surveying process.

The purpose of this evaluation is to document and evaluate the LYMMO service as one of the newest applications of BRT service in the U.S. The National Bus Rapid Transit Institute (NBRTI) in partnership with Central Florida Regional Transportation Authority (Lynx), FDOT, and FTA is conducting an objective evaluation of the LYMMO and realization of community goals since inception of the LYMMO in August 1997.

Technical Memorandum One (1) provides a comprehensive profile of the LYMMO system from inception to operation including a historical narrative, engineering and construction, communications, and institutional documentation. Technical Memorandum One serves as the foundation for the remaining tasks of this evaluation project.

Historical Narrative

In 1972, a special taxing district determined by a referendum for the purpose of encouraging redevelopment planning and programming was assigned to the Downtown Development Board (DDB). Into the early 1980s, Orlando continued to express interest in promoting downtown revitalization and determined it would be achieved by providing adequate infrastructure development, including parking. Understanding the importance of pedestrian accessibility and increased development capacity in order to encourage the occurrence of redevelopment in the centralized downtown core, the DDB and the Community Redevelopment Agency (CRA) emphasized the concept of perimeter parking. Once this idea was adopted, the need for a quick and reliable transportation alternative was eminent, resulting in the conception of the LYMMO project. Prior to the arrival of the LYMMO's system design to Downtown Orlando however, a series of other systems were tried.

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The Meter Eater service was the first circulator system used in Downtown Orlando. Introduced to downtown in 1983, service was provided by trolleys and ran from parking garages located along the periphery to the center of the Central Business District (CBD) for $0.25. The community immediately accepted the system and encouraged enhancements to the project. In 1984, the Meter Eater system was sold and became the *FreeBee*. Service of the *FreeBee* had the same purpose, yet funding was provided through parking revenues generated by the city. The *FreeBee* added eight full-size buses, and as an effort to attract attention, painted them with Florida flora and fauna scenes. The system witnessed an increase in ridership over its years of service to 1,750 trips per day. The increase in ridership encouraged the city and Lynx to explore additional options. In 1989 the city purchased OSCAR, a vintage electric streetcar introduced for promotional purposes of the circulator project, which facilitated additional interest in providing an environmentally sound method to reduce traffic congestion and parking volumes. In 1994, after determining the route and transit technology, the decision was made to approve the LYMMO project and design of the project promptly ensued.

LYMMO System

The LYMMO system provides service on a north-south route connecting the Centrolplex Garage at the Orlando Arena to City Hall located in the center of downtown. The route is a three-mile loop on which ten buses provide very frequent service during the day and less in the evening.

In traveling the route, buses serve eleven stations and eight stops, resulting in a total travel time of eighteen minutes.

LYMMO uses state of the art technology to enhance service. The Intelligent Transportation Systems used on the LYMMO are dedicated lanes, advanced computer monitoring system, and multi-modal center. The system uses audio/visual-tracking information, located on the computerized kiosks that provide real-time bus information. All of the vehicles are installed with a tracking-system in order to be able to determine exact location, destination and estimated arrival times. There is also a transponder and sensor system in place to synchronize and control traffic signals and allow for traffic signal prioritization. The multi-modal center is part of the future plans to interphase with light rail transit and inter-city transit. The goal is to maximize the transfer opportunities between LYMMO and Lynx. Although LYMMO does not provide direct access to the Lynx transfer facility, transfer opportunities do exist for most downtown Lynx bus routes.

Funding and Project Costs

The LYMMO is a $21 million project funded jointly by the Federal Transit Administration (FTA), city of Orlando Downtown Development Board (DDB), the Central Florida Regional Transportation Authority (Lynx), Community Redevelopment Agency (CRA) and the city parking system. Initial project funding was provided in the amount of $5 million from the FTA in response to grant submissions prepared by the client and project manager. Once cost estimates were determined and preliminary project information was available, final project funding contribution was distributed in the following manner:

- FTA – 50 percent - $10.5 million
- FDOT – 25 percent - $5.25 million
- Local Match – 25 percent - $5.25 million

The source of funding of the FTA was under the authorization of the "New Starts" program, which provides money for transit systems within the country. FDOT's Transit Capital Program was slotted as the revenue source for its contribution.

The City of Orlando, responsible for the management of construction and fund operations and maintenance, headed an operations agreement of which Lynx worked under. The revenue source for the funding of operations and maintenance was the Parking Enterprise Fund that was

associated with downtown parking facilities and the *FreeBee* circulator service that was running when funding allotment was determined.

Engineering and Construction

Planning for the project included discussions for the preferred route and transit technology to be used. The bid phase for construction of the system began in early 1996, the same time construction documents were completed. Hubbard Construction of Orlando was selected and was to oversee the construction process for 16 months. The DDB and CRA opened a construction office and assigned a Public Information Principal (PIP) to serve as a source for concern regarding the impacts of construction on local businesses. In order to alleviate the potential of negative impacts on downtown businesses during construction, the project was carried out in phases. Each phase was a segment that consisted of several blocks and was scheduled for a three to four month duration.

Prior to the physical construction of the system, traffic analyses were conducted to evaluate traffic signal system operations, running times and headways for the system in order to determine the number of buses needed. The evaluations considered travel time and delay using the NETSIM software program. The analysis discovered that the system's concepts could be implemented into the CBD without creating negative significant impacts upon the current level of service.

Exclusive Roadways

The system was designed as to set the groundwork for a regional transportation system hub that offered the capability of linking a future light rail system and the downtown bus station together. Project design was successful in avoiding the need for business relocation for right-of-way attainment. In order to ensure the free movement of buses through traffic, exclusive roadways were built along with grade separations from the traditional roadway. In addition to providing greater ability for the facilitation of traffic flow, safety increased as well. The construction of contra-flow lanes, a concept of which buses run in the opposite direction of the existent traffic pattern, within the street system afforded greater service capabilities as well.

Stations and Stops

In an effort to build the character of the system, it was determined that the design of the station and streetscape components was to be distinguishable. Along Livingston Street and

Magnolia Avenue, the transit streetscape was designed uniquely in comparison with other downtown streetscape treatments that are found along South Street, Orange Avenue, Church Street, Garland Avenue, Amelia Street, Alexander Place, and Hughey Avenue all of which were to match the existing streetscape.

To maximize the uses of the system, stations shelters were located near signalized intersections. Station infrastructure is characteristic of having a free standing, open-air, canopied station. A number of amenities are provided at each station as well, including security lighting, information kiosks, and trash receptacles and lean bars. Station areas are located at sidewalk level and are distinguishable through the use of pavement markings.

Communications

To introduce LYMMO to Downtown Orlando as a high quality service and familiarize the community of its purpose, the LYMMO Communication Outreach Program was established. The target audiences for the program included public agencies, the business community, professional associations and the general public. A separate format for communications was determined for each audience, given the interests that were prominent among each group.

Federal Transit Administration

The approach taken towards the FTA regarding the LYMMO Project was technical in nature, offering information on the community, demographics, systems design, construction costs, and operation. The media approaches used to inform and sell the FTA on LYMMO included a 5 to 7 minute video that described the characteristics of the system, brochures with graphics and charts to accompany the video and a project showcase. The showcase offered an on-site inspection of the facility and operations.

Professional Affiliations

Technical information that would be useful to transit professionals interested in the project was provided to this group as well. The target audience within this group included groups such as the Transportation Research Board, American Public Transportation Association, and the American Planning Association. Newsletter and magazine articles which were accompanied by graphics, video and PowerPoint presentations shown at meetings and conferences, brochures, displays, and awards distributed through organizational programs were formats used to communicate the systems' characteristics.

Public Agencies

The City of Orlando Community Redevelopment Agency, the Orlando Downtown Redevelopment Board, City of Orlando, Orange County, MetroPlan, Seminole County, and Osceola County were local entities that were considered in the Communication Outreach Program. Newsletter and magazine articles along with presentations were used as the main media vehicles for these agencies to keep them informed in the participation of the LYMMO so as to create a sense of ownership. Video and PowerPoint presentations and brochures were also supplied, in addition to the incorporation of a link through agency websites on the Internet to the Lynx site where information regarding route details and an overview of the system was encouraged.

Business Communities

Communication Outreach was geared toward promoting project awareness and use among the business community. Encouraging a relationship among businesses that would increase ridership and promote participation of the parking system among their employees and patrons influenced the communication approach used for this group. On-site visits were conducted to large organizations and the Chamber of Commerce was included as another source for the facilitation of information in addition to traditional media vehicles.

Institutional: Public Process

In order to meet the requirements of the project, public participation was to be significant in each stage of development. To fulfill this need, monthly meetings were held during the preliminary stages of engineering as well as monthly meetings headed by the Chairman of the Project Management Group that consisted of participation from the Citizens Advisory Committee and the Project Steering Committee. Members from the Project Steering Committee included representatives from FDOT, the MPO, Orange County and Lynx. Representatives of the local business and residence communities were on the Citizens Advisory Committee.

To meet the vision for downtown transit that had been realized, a project management component was developed and later resulted in an implementation team. It was determined that a client representative, project manager and steering and advisory committees were to be established to ensure the organized development of the system. The client representative was to coordinate public involvement, monitor city department and financial issues, and secure the consultant for project management and board approvals. The project manager was involved in

project coordination, environmental assessments, market analysis, the hiring of consultants, and securing federal funds for the initial stages of the project. In addition, the project manager established several committees and groups to provide assistance among various components of the project.

Marketing

Orlando's DDB worked with and continues to work with Lynx to market the LYMMO project. Marketing pieces were sent to residents and merchants. When the LYMMO service started, the project was featured in a cover story in Downtown Orlando Monthly. Bus stations say "LYMMO" in large letters. The 10 new buses are painted with artistic themes, in what Lynx calls a moving museum or "Moveum." Every 6 to 12 months, Lynx expects to repaint its LYMMO bus fleet. The initial series was based on "Imperial Tombs of China." The paint schemes are complemented by brochures inside the vehicles and banners on the road. LYMMO offers "Daily Deal" discounts from downtown merchants for riders who have a coupon stamped on board, which also enable riders to enter a raffle. Downtown Orlando events (e.g., festivals and concerts) have tie-ins to LYMMO service.

Documentation of Technology

This section of the evaluation provides a description of the technologies used on the LYMMO to improve service provision and enhance the customers' riding experience. The following describe the low-floor vehicles, propulsion system, automated vehicle location, driver information devices (DID), transit signal priority, multi-modal center, underground sensors and in-ground lighting, and maps of the schemes for these systems.

Vehicles

The LYMMO vehicle is special in design with a unique appearance and different performance characteristics from other transit vehicles operated by Lynx on regular fixed route service and contract service. Technical specifications were developed for advanced design, heavy duty, wheelchair accessible, low floor, and alternative fuel vehicles. The features of the LYMMO vehicle are summarized in the following sections.

Vehicle Dimensions

The technical specifications for the LYMMO vehicle were developed for a 35-foot long vehicle with a nominal width of 102 inches (8 feet 6 inches). The vehicles have two doors: (1) a front door that is opposite the driver's seat that is equipped with an electronically operated ramp for disabled customers; and (2) a rear door located in the vehicle mid-section, between the front and read vehicle axles. To facilitate boarding and alighting, the LYMMO vehicles feature a total low-floor design whereby the interior is no more than 14-inches above street level throughout the length of the vehicle.

Passenger Capacity

The vehicles seat 20 customers in a perimeter, aisle-facing configuration and provide enough space for 53 standing customers (2.0 sq. ft. per standee) at crush load. Each vehicle provides for two wheelchair tie down positions. The vehicles provide for three different design loads depending on the different service conditions including off-peak, peak hour, and special events. The different load conditions are as follows:

- Off-peak: 20 seated customers
- Peak hour: 20 seated customers and 36 standing customers (3.0 sq. ft. per standee)
- Special event: 20 seated and 53 standing customers (2.0 sq. ft. per standee)

ADA Provisions

The LYMMO vehicles feature a total low-floor design whereby the interior is no more than 14-inches above street level throughout the length of the vehicle. The low-floor design facilitates boarding and alighting and meets the Americans with Disabilities Act (ADA). To facilitate access by disabled customers, the LYMMO vehicles feature an electrically operated ramp at the front door and the vehicles are capable of kneeling. With these features, near-level boarding is provided at all LYMMO stations for disabled customers.

Performance Characteristics

Vehicles have a minimum life of 12 years or 500,000 miles. Vehicles are powered by a diesel engine adapted for compressed natural gas (CNG). The CNG powered diesel engines are

compliant with all emission standards. CNG fuels cylinders are roof mounted and have a minimum capacity to enable vehicles to travel 400 miles before refilling. The vehicles are capable of achieving maximum speeds of 60 to 65 mph.

Communications

The vehicle operator's position contains radio controls for two-way voice communications between the Operator and Lynx dispatch office or other Lynx staff. Other communications equipment on vehicles includes a public address system that enables the Operator to make announcements to customers inside and outside, an electronic voice announcer that announces stations and stops, and AM/FM radio.

Other Features

Other features of the LYMMO include the following:

- GFI Fare Boxes
- Destination signs on the front, side, and rear of vehicles
- Vehicles are climate controlled featuring both heat and air conditioning
- A security camera on vehicles mounted near the Operator position
- Exteriors of vehicles are treated with Contravision
- Information racks provided on the barrier behind the Operator position

Stations

LYMMO customers board and alight at stations that are designed to comply with all requirements of the Americans with Disabilities Act (ADA). This section discusses the stations and their operating conditions.

Station Descriptions

LYMMO stations are of simple design with sidewalk level platforms. Provisions to accommodate elderly and disabled customers include ramps, textured surfaces, high visibility markings, and other such devices to assist the physically challenged in using the system.

The LYMMO system includes 11 lighted and computerized stations and eight additional stops. In general, station locations were selected because they provide reasonable station spacing for

maximizing service coverage, facilitate transit connections with other Lynx services, and serves major origins and destinations in Downtown Orlando. Stations are designed to operate without staff. Exhibit 1 shows the station and stop locations and characteristics.

Exhibit 1: Station and Stop Location and Characteristics

Station	Location	Direction of Travel	Placement of Running Way	Platform Location
Centroplex Garage	-	S	NA	NA
Livingston Street	West of Orange Avenue	E	Median	Side
Livingston Street	West of Magnolia Avenue	E	Median	Side
Magnolia Avenue	North of Jefferson Street	S	West Curb	Side
Magnolia Avenue	North of Washington Street	S	West Curb	Side
Magnolia Avenue	North of Central Boulevard	S	West Curb	Side
South Street	East of Orange Avenue	W	North Curb	Side
Church Street	East of Orange Avenue	E	South Curb	Side
Magnolia Avenue	North of Central Boulevard	N	Median	Side
Magnolia Avenue	North of Washington Street	N	Median	Side
Magnolia Avenue	North of Jefferson Street	N	Median	Side
Livingston Street	West of Magnolia Street	W	North Curb	Side
Livingston Street	West of Orange Avenue	W	North Curb	Side

In addition to the stations in Exhibit 1, six passenger stops are also provided:

1. Hughey Avenue north of Livingston Street
2. Magnolia Avenue south of Church Street
3. Magnolia Avenue north of South Street
4. Church Street west of Magnolia Avenue
5. Livingston Street east of Garland Avenue
6. Garland Avenue south of Amelia Street

LYMMO stations are standardized to the maximum extent possible to facilitate customer use, optimize procurement, and minimize maintenance costs, standardized elements include shelters, leaning rails, lighting, system graphics, equipment for a Passenger Advisory System (PAS), an art component, trash receptacles, and for provisions for the physically challenged.

Station Features

Accessibility

Station platforms are level with the sidewalk, about six inches above the street. For additional safety, platforms are non-skid and weather resistant. Platform edges have a continuous 24-inch wide tactile warning strip. All station platforms meet ADA requirements. All stations are approximately 50 feet in length and the width depends on site conditions.

Communications

Station communications are via a Passenger Advisory System (PAS). The station equipment for the PAS system includes a mimic board, variable message signboard, and two speakers for an audio broadcast system. The PAS provides customers awaiting buses at stations with information about the LYMMO service.

Recently, 11 station kiosks were upgrade and equipped with computers that provide real-time vehicle information to customers via a wireless 802.11b system. The intention of the upgrade was to significantly improve the quality, ease of use, and reliability of the existing kiosk information system. This was accomplished by replacing the old LED map display with a high resolution LCD video monitor. The ease of use was improved by the speed at which information such as the name of a building can be changed. The new kiosk system provides for 100 percent remote modifications to textual and audible messages. The reliability of the system was improved by utilizing a wireless method of getting the vehicle location data to the kiosks. The current system utilizes in-ground sensors that require frequent maintenance. The TTN (formerly ITEC) Network will utilize advanced wireless Ethernet technology to completely eliminate sensor hardware in the streets, except where determined feasible to connect kiosks opposite each other at same general location. Exhibit 2 shows a station kiosk.

The key to the operation of the system is the new wireless infrastructure. Based on the results of some initial engineering surveys, the wireless infrastructure (antennas) was mounted low, meaning not requiring mounting on any tall structures. The final design installed antennas on top of the Kiosks, station platforms, certain light poles, landscape poles, and the Centroplex parking garage.

Kiosk Equipment

Each kiosk includes the following equipment:

- (1) ITEC Network 3021 Media Engine
- (1) LCD Monitor (Approx. 20" diagonal)
- (1) Custom LCD monitor Safety Glass
- (1) GPS Antenna
- (1) Wireless LAN Antenna
- Interconnecting Cables as required
- Monitor Mounting Brackets as required
- (1) Amplifier and Speaker

Media Engine Equipment

The 3021 Media Engine includes components that meet or exceed the following specifications:

- Processor – Intel Pentium 3
- Wireless LAN Features –
- IEEE 802.11b Compliant
- Up to 11 Mbps data transfer speed
- 100 Milliwatt radio design
- Autosensing 10/100 BaseT Ethernet uplink
- Direct Sequence Spread Spectrum (DSSS) wireless medium
- 2.4 to 2.4897 GHZ frequency Band
- Carrier sense multiple access with collision avoidance (CSMA/CA)
- Radio Compliance: Operates license free under FCC part 15 and complies as a class B device; complies with DOC regulations; complies with ETS 300.328, FTZ 2100 and MPT 1349 standards
- Audio Amplification – Two Channels, 30 Watts per channel

Exhibit 2: LYMMO Station Kiosk

Signage

LYMMO signage is in accordance with City of Orlando and Lynx policies and ADA requirements to inform patrons through the system in an efficient, safe, and uncomplicated manner. Signs are clear and concise, providing information about the LYMMO route and schedules as well as other Lynx regional transit services.

Weather Protection

Station platforms have canopies that provide protection from the weather, both heat and rain. Canopies are modular to facilitate expansion, where warranted. The Canopies are durable, vandal-resistant, and economic to repair or replace, as shown in Exhibit 3.

Exhibit 3: LYMMO Station Weather Protection

CentroPlex Parking Garage (Multi-Modal Center)

The LYMMO system is configured with a single terminal at the CentroPlex Garage. This terminal is the starting and ending points for all revenue service on the LYMMO. The Garage was modified to handle the north to south flow of LYMMO vehicles. Passenger platforms and facilities such as benches and system information are located within the Garage. The Garage also has a restroom for operators and supervisors and provides ample non-transit vehicle parking.

Supervisor Booth

The supervisor booth is a small enclosed structure adjacent to the Garage boarding and alighting area, as shown in Exhibit 4. The booth is sufficient for one supervisor to have a chair and desk and has windows on all sides. The booth has communication facilities including a telephone. The booth is climate controlled for heat and cold.

Exhibit 4: LYMMO Supervisor Booth (CentroPlex Garage)

Transit Television Network (formerly ITEC)

The TTN offers communications to customers about stops, real-time route information and ride-enhancing news, weather, and entertainment content. Customers are constantly shown their location on the Trav-Bar™, a real-time graphical route navigation bar located on each TTN screen. Two TTN screens are on every LYMMO vehicle, as shown in Exhibit 5.

Exhibit 5: Transit Television Network (formerly ITEC)

Driver Information Devices (DID)

The operator's position in vehicles contains radio controls for two-way voice communications between the operator and Lynx dispatch or other personnel. The vehicles also contain communications equipment including a public address system that enables operators to make announcements to customers inside and outside the vehicles and an electronic voice enunciator that announces stops and stations, general operations, and for instruction on emergency procedures.

Exclusive Bus Traffic Signal Phasing

At eleven intersections, approaching buses actuate exclusive bus phases. Windows for bus-only phases (about 10 seconds) are available only at the end of a concurrent auto phase or the beginning of an opposing phase. The intersections are located at the following cross streets:

1. Amelia Street and CentroPlex Parking Garage Entrance
2. Alexander Place and CentroPlex Parking Garage Exit
3. Livingston Street and Magnolia Avenue
4. Livingston Street and Garland Avenue
5. Magnolia Avenue and Robinson Street
6. Magnolia Avenue and Jefferson Street
7. Magnolia Avenue and Washington Street
8. Magnolia Avenue and Central Boulevard
9. Magnolia Avenue and Church Street
10. Garland Avenue and Ameila Street
11. Hughey Avenue and Livingston Street

Because the LYMMO operates in places and directions contrary to other vehicular traffic, all bus movements at intersections are controlled by special bus signals, as shown in Exhibit 6. To

prevent confusion, the bus-only signal heads are mounted directly over the bus-only lanes and use illuminated lunar white bars on a three-aspect display unit to signify Stop, Prepare to Go, and Go. The signals are loop actuated so that non-LYMMO buses using the bus-only lanes will get a signal. Basically, when a LYMMO vehicle approaches an intersection, a loop detector in the bus-only lane triggers the intersection to allow the vehicle to proceed either in its own signal phase (e.g. when making turns not otherwise permitted) or at the same time as other vehicular traffic is released when no conflicting traffic movements are permitted. All time for activation of a bus-only phase is taken from the time allotted to the minor cross-street phases so progression on the major street is not disrupted.

Exhibit 6: LYMMO Special Bus Signals

Signage and General Traffic Restrictions

The signage and general traffic restrictions use signs, pavement markings, traffic signals, and enforcement, as shown in Exhibit 7. Signage is comprised of informational station signage for passengers and regulatory signage for other vehicular traffic. Informational station signage for customers includes station names, station stops, frequency of service, hours of service, and transfer options to other Lynx services. Regulatory signage consists primarily of turning restriction and "Do Not Enter" signs.

Exhibit 7: LYMMO Signage and General Traffic Restrictions

Underground Sensors and In-ground Lighting

The underground sensors and in-ground lighting were disconnected due to operational malfunctions. The underground sensors and in-ground lighting were removed altogether and covered with aluminum covers.

Exclusive Right-of-Way

Engineering and Construction

The exclusive lanes are paved with a variety of distinctive exposed-aggregate colored-concrete finishes. The LYMMO right-of-way concrete aggregate finishes are colored either Creole Dark II or Westwood Brown. The exclusive right-of-way is separated from general traffic lanes either with a raised concrete median or a double row of raised reflective ceramic pavement markers embedded in the asphalt. In the middle segment of the LYMMO route, the two directions of LYMMO service are on the same street, with one being contra-flow to the general traffic lanes.

Operational Characteristics

Hours of Service

The LYMMO operates in revenue service from 6 AM to 10 PM Mondays through Thursdays (16 hours), 6 AM to Midnight on Fridays (18 hours), 10 AM to Midnight on Saturdays (16 hours), and 10 AM to 10 PM on Sundays (12 hours). Sunday hours of service are in effect on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas. Service hours may change for special events or as demand dictates. Additional vehicles are provided as needed for operations for special events such as special contracts with the City of Orlando for events like concert and basketball games at the O-Rena/TD Waterhouse Centre.

Days of Service

The LYMMO operates seven (7) days per week, unless specified including holidays.

Frequency of Service

The LYMMO buses run approximately every five minutes during office hours. After hours, LYMMO buses run approximately every 10 minutes. Weekend service on Saturday is either every 10 or 15 minutes depending on time of day and Sunday service is every 15 minutes.

Vehicles in Service

Ten (10) low-floor vehicles circulate on the continuous LYMMO loop throughout the daily span of service.

Fare Structure

The LYMMO is free to ride at all times during revenue service.

Routing

The LYMMO consists of a one-way, 3.0-mile single lane loop of exclusive and mixed-use lanes through Downtown Orlando.

Daily Vehicle Trips

The LYMMO operates 186 trips (loops) on Mondays through Thursdays, 198 trips on Fridays, 85 trips on Saturdays, and 65 trips on Sundays.

Dispatch Capabilities and Unexpected Demand

The LYMMO uses the same radio capabilities as regular Lynx buses with a supervisor located in CentroPlex Parking Garage. Unexpected demand is handled by providing plug buses as needed.

Operations for Special Events

In addition to its function as a distribution system for the downtown area, the LYMMO also operates for special events at various downtown venues. Operations for special events are provided for as part of special contracts with the City of Orlando for events such as concerts and basketball games at the O-Rena/TD Waterhouse Centre. Due to high demand, the operations for special events usually run at peak service levels. Given various physical and operational constraints, operations for special events are driven by vehicle supply considerations as well as customer demand.

Ridership

LYMMO ridership consists of customers that board at the CentroPlex Parking Garage, customers that transfer from Lynx local and express routes, and customers that use the LYMMO to circulate in Downtown Orlando. Exhibit 8 contains LYMMO ridership since the inception of LYMMO revenue service in August 1997 to the October 2002. The exhibit below shows LYMMO ridership by average weekday and Saturday, Sunday, and monthly totals.

Exhibit 8: LYMMO Ridership Data

Month / Year	Weekday	Saturday	Sunday	Total
31-Aug-97	2,660	874	450	61,150
30-Sep-97	2,627	772	628	61,384
31-Oct-97	3,260	1,029	640	81,657
30-Nov-97	3,406	1,067	711	74,310
31-Dec-97	3,502	1,063	505	83,810
31-Jan-98	3,693	1,134	583	86,130
28-Feb-98	4,140	1,197	560	89,833
31-Mar-98	4,204	1,266	845	101,772
30-Apr-98	4,427	1,444	607	105,600

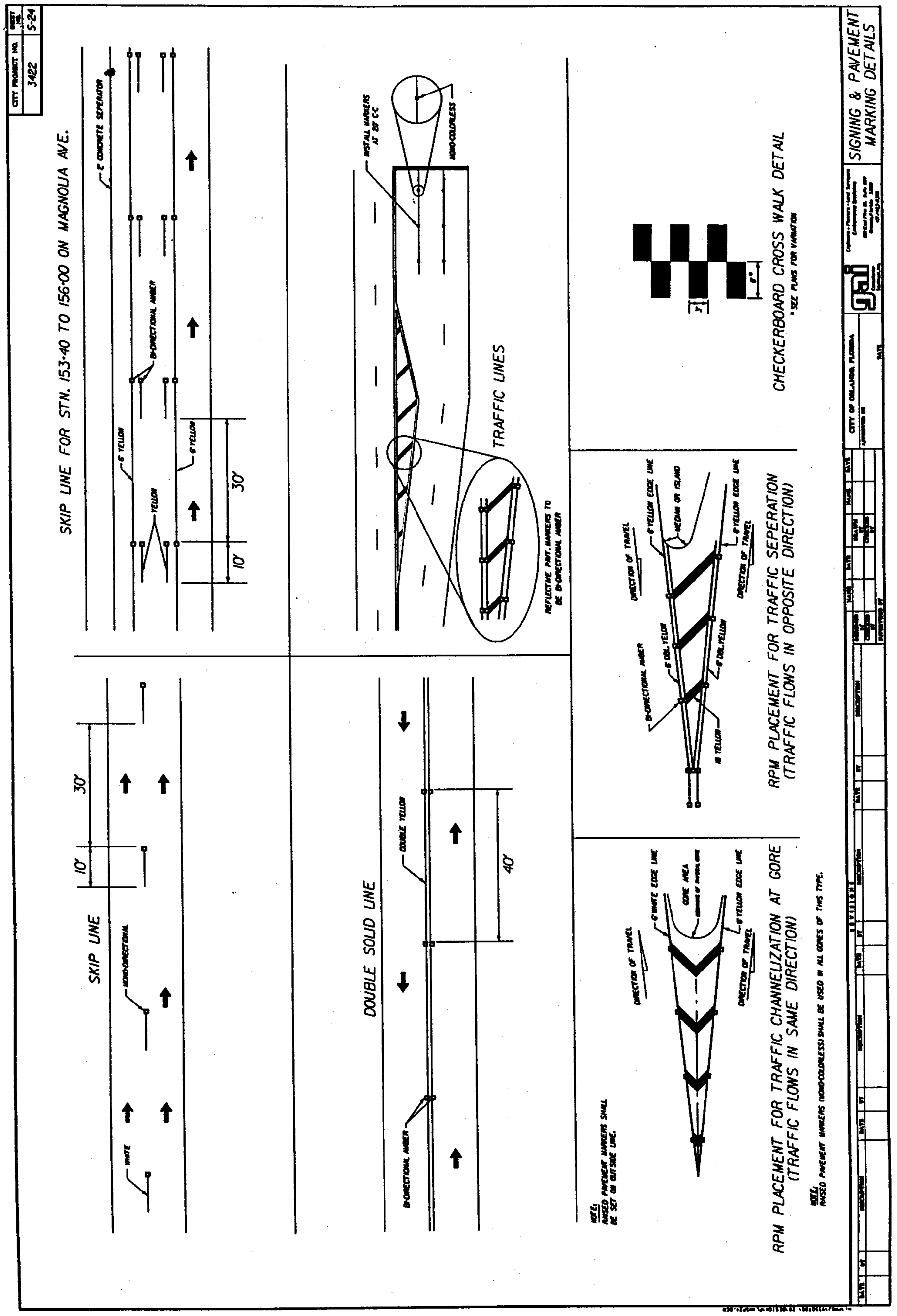
Exhibit 8: LYMMO Ridership Data

Month / Year	Weekday	Saturday	Sunday	Total
31-May-98	3,998	1,028	537	88,328
30-Jun-98	4,079	795	433	94,657
31-Jul-98	4,051	927	651	99,213
31-Aug-98	4,359	740	452	97,502
30-Sep-98	4,200	1,009	556	95,009
31-Oct-98	4,439	1,392	912	108,276
30-Nov-98	3,978	1,031	747	88,162
31-Dec-98	3,530	850	481	83,456
31-Jan-99	4,155	1,218	532	92,384
28-Feb-99	4,428	1,368	876	97,536
31-Mar-99	4,509	1,316	962	112,825
30-Apr-99	4,418	1,333	774	105,627
31-May-99	4,154	803	518	90,197
30-Jun-99	4,044	1,073	460	95,104
31-Jul-99	3,802	855	468	89,778
31-Aug-99	4,133	827	475	96,600
30-Sep-99	4,028	805	404	85,795
31-Oct-99	4,071	703	506	91,537
30-Nov-99	4,060	866	659	92,007
31-Dec-99	3,538	873	472	86,346
31-Jan-00	4,057	1,097	619	93,295
29-Feb-00	4,398	1,099	610	99,197
31-Mar-00	4,335	1,556	753	108,944
30-Apr-00	4,192	1,229	630	93,127
31-May-00	4,078	771	597	95,783
30-Jun-00	4,174	769	430	96,631
31-Jul-00	3,877	856	615	85,501
31-Aug-00	4,182	692	771	102,034
30-Sep-00	4,332	944	436	93,548
31-Oct-00	4,147	955	720	98,640
30-Nov-00	4,028	1,012	683	92,042
31-Dec-00	3,407	911	472	75,533
31-Jan-01	3,735	1,281	500	89,790
28-Feb-01	3,976	1,145	757	87,118
31-Mar-01	3,810	1,251	658	92,709
30-Apr-01	3,984	1,360	679	92,498
31-May-01	3,800	1,007	530	90,267
30-Jun-01	3,896	656	465	86,953
31-Jul-01	3,771	794	601	85,977
31-Aug-01	3,949	767	540	96,056
30-Sep-01	4,138	757	490	85,340
31-Oct-01	4,183	750	460	101,046
30-Nov-01	3,843	1,044	420	86,980
31-Dec-01	3,427	649	378	74,047
31-Jan-02	3,740	924	482	88,393
28-Feb-02	3,890	853	539	83,365
31-Mar-02	3,753	747	476	84,921
30-Apr-02	3,997	765	496	92,968

Exhibit 8: LYMMO Ridership Data

Month / Year	Weekday	Saturday	Sunday	Total
31-May-02	3,912	882	499	92,081
30-Jun-02	3,632	744	438	78,540
31-Jul-02	3,447	765	595	81,857
31-Aug-02	4,080	516	577	94,640
30-Sep-02	4,137	709	439	88,213
31-Oct-02	4,215	766	445	101,793

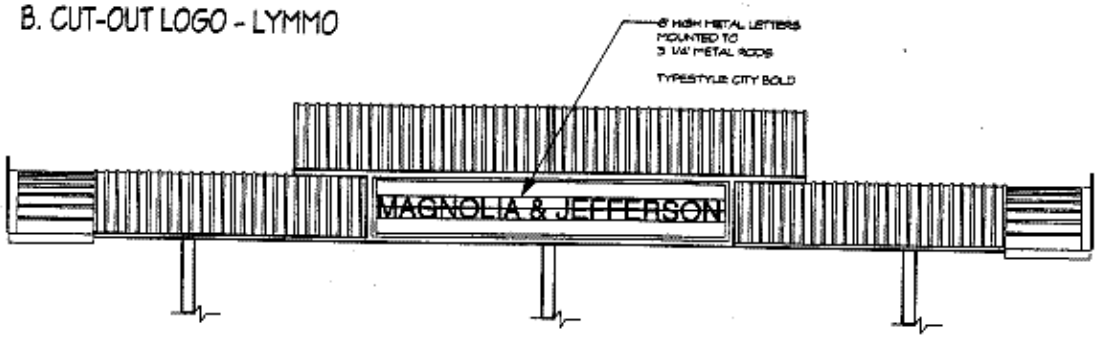
Appendix A: Engineering Documents and Schematics



SKIP LINE FOR STN. 153+40 TO 156+00 ON MAGNOLIA AVE.
SKIP LINE
DOUBLE SOLID LINE
TRAFFIC LINES
CHECKERBOARD CROSS WALK DETAIL
RPM PLACEMENT FOR TRAFFIC SEPERATION (TRAFFIC FLOWS IN OPPOSITE DIRECTION)
RPM PLACEMENT FOR TRAFFIC CHANNELIZATION AT GORE (TRAFFIC FLOWS IN SAME DIRECTION)
SIGNING & PAVEMENT MARKING DETAILS
3422
S-24

END ELEVATION

B. CUT-OUT LOGO - LYMMO



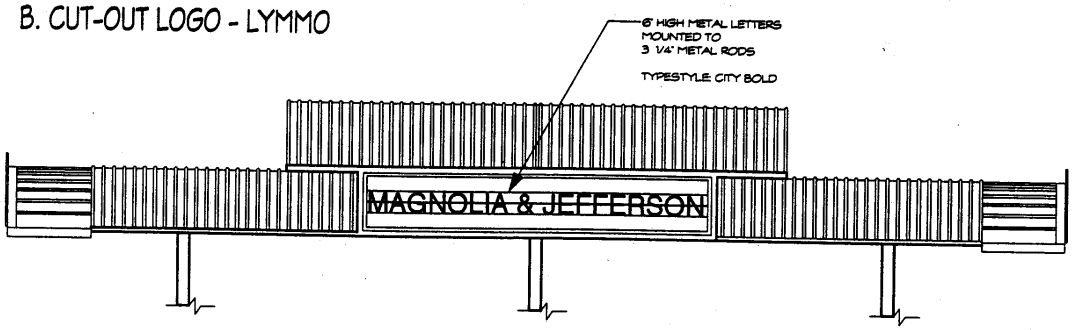
NOTE: EACH SHELTER STRUCTURE TO RECEIVE (2) SETS OF LOCATION LETTERS. MOUNT (1) SET EACH SIDE.
STOPS WITH (2) BAYS AT ANY GIVEN LOCATION TO RECEIVE (4) SETS OF LOCATION LETTERS.
SEE SHTS LS 9 & LS 10 FOR SHELTER BAY DETAILS.

SHELTER COPY:
SOUTH STREET 2 SETS
CHURCH STREET 2 SETS
MAGNOLIA & CENTRAL 4 SETS
MAGNOLIA & JEFFERSON 4 SETS
LIVINGSTON & ORANGE 4 SETS
LIVINGSTON STREET 4 SETS

A. CUT-OUT METAL LETTERS - BUS SHELTER IDENTIFICATION

END ELEVATION

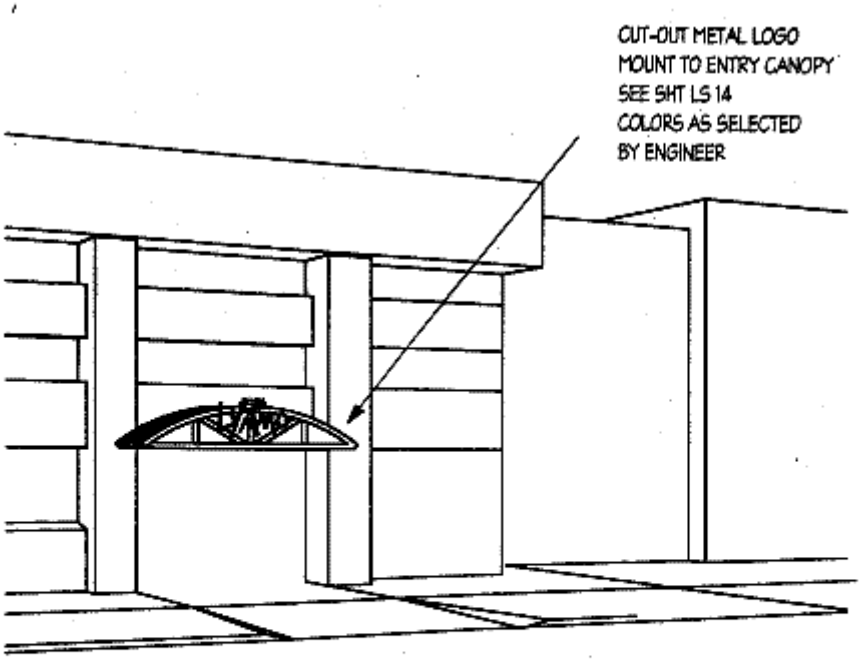
B. CUT-OUT LOGO - LYMMO



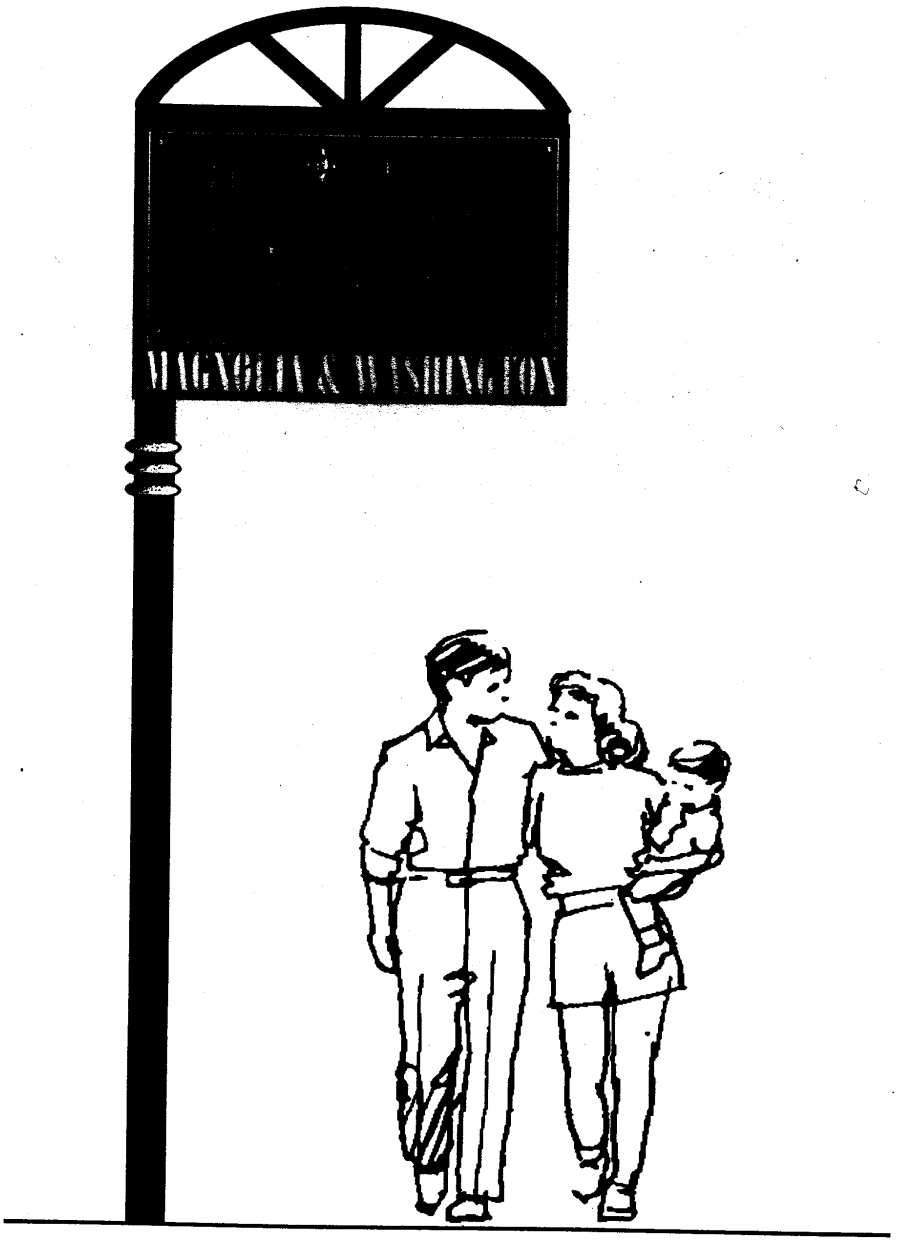
NOTE: EACH SHELTER STRUCTURE TO RECEIVE (2) SETS OF LOCATION LETTERS. MOUNT (1) SET EACH SIDE.
STOPS WITH (2) BAYS AT ANY GIVEN LOCATION TO RECEIVE (4) SETS OF LOCATION LETTERS.
SEE SHTS LS 9 & LS 10 FOR SHELTER BAY DETAILS.

SHELTER COPY:
SOUTH STREET 2 SETS
CHURCH STREET 2 SETS
MAGNOLIA & CENTRAL 4 SETS
MAGNOLIA & JEFFERSON 4 SETS
LIVINGSTON & ORANGE 4 SETS
LIVINGSTON STREET 4 SETS

A. CUT-OUT METAL LETTERS - BUS SHELTER IDENTIFICATION



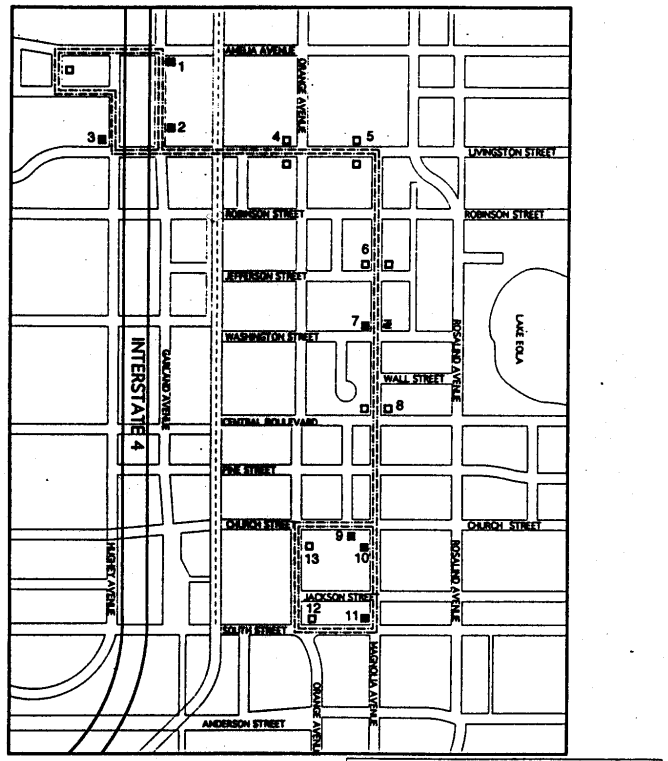
E. PARKING GARAGE IDENTIFICATION



STOP IDENTIFICATION

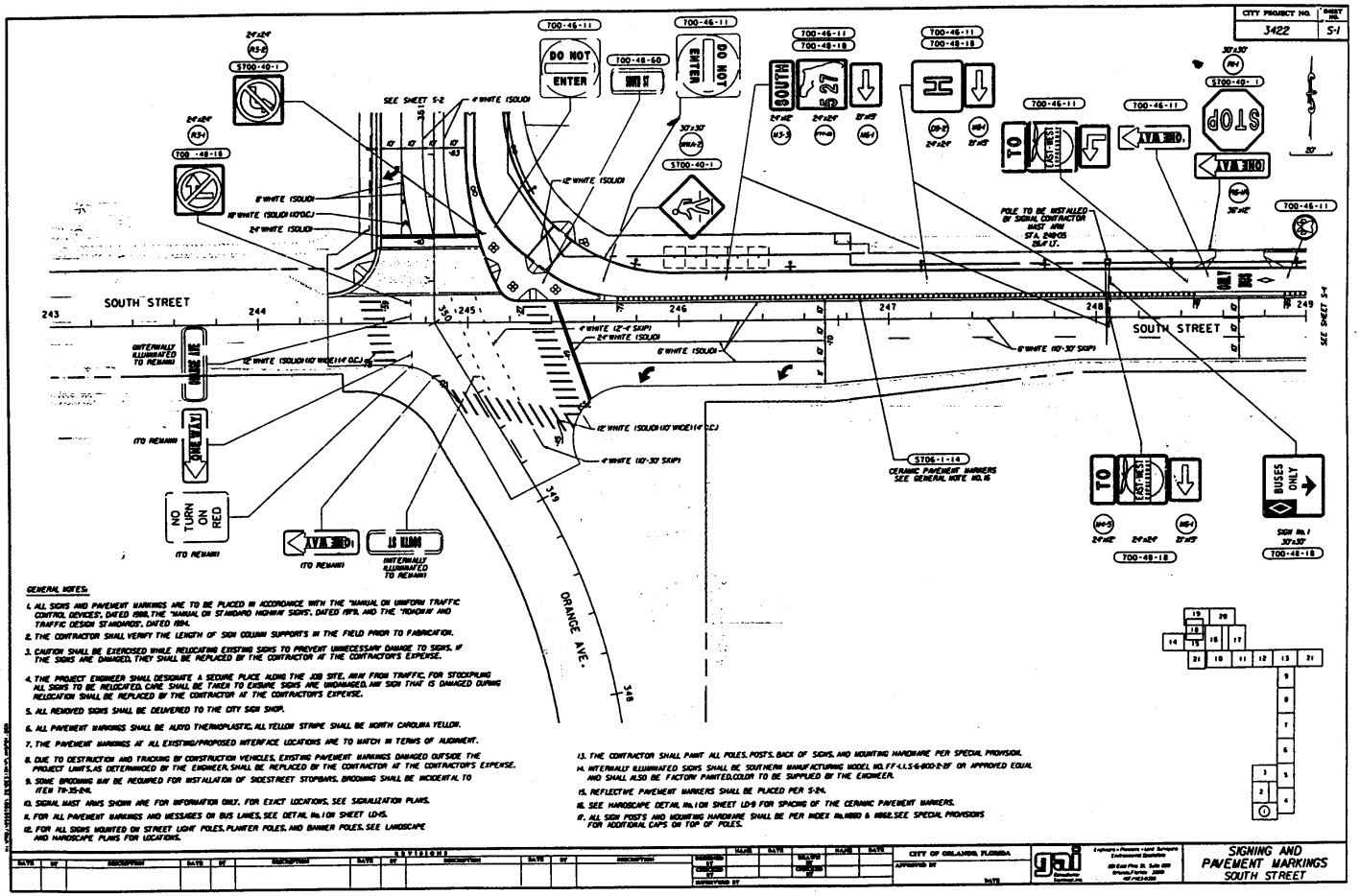
LYMMO KIOSK - FRONT

HART



1 * Amelia & Garland
2 * Garland & Livings
3 * Hughey & Livingst
4 • Orange & Livingst
5 • Court House Stati
6 • Jefferson & Magn
7 * Washington & Ma
8 • Central & Magnoli
9 * Church & Magnoli Northbound
10 * Magnolia & Churc Southbound
11 * Magnolia & South
12 • City Hall Station
13 • Church & Orange

REVISIONS
CITY OF ORLANDO, FLORIDA



GENERAL NOTES:

1. ALL SIGNS AND PAVEMENT MARKINGS ARE TO BE PLACED IN ACCORDANCE WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", DATED 1988, THE "MANUAL OF STANDARD HIGHWAY SIGNS", DATED 1985, AND THE "ROADWAY AND TRAFFIC DESIGN STANDARDS", DATED 1994.
2. THE CONTRACTOR SHALL VERIFY THE LENGTH OF SIGN COLUMN SUPPORTS IN THE FIELD PRIOR TO FABRICATION.
3. CAUTION SHALL BE EXERCISED WHILE RELOCATING EXISTING SIGNS TO PREVENT UNNECESSARY DAMAGE TO SIGNS. IF THE SIGNS ARE DAMAGED, THEY SHALL BE REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
4. THE PROJECT ENGINEER SHALL DESIGNATE A SECURE PLACE ALONG THE JOB SITE, AWAY FROM TRAFFIC, FOR STOCKPILING ALL SIGNS TO BE RELOCATED. CARE SHALL BE TAKEN TO ENSURE SIGNS ARE UNDAMAGED. ANY SIGN THAT IS DAMAGED DURING RELOCATION SHALL BE REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
5. ALL REMOVED SIGNS SHALL BE DELIVERED TO THE CITY SIGN SHOP.
6. ALL PAVEMENT MARKINGS SHALL BE ALKYD THERMOPLASTIC. ALL YELLOW STRIPE SHALL BE NORTH CAROLINA YELLOW.
7. THE PAVEMENT MARKINGS AT ALL EXISTING/PROPOSED INTERFACE LOCATIONS ARE TO MATCH IN TERMS OF ALIGNMENT.
8. DUE TO DESTRUCTION AND TRACKING BY CONSTRUCTION VEHICLES, EXISTING PAVEMENT MARKINGS DAMAGED OUTSIDE THE PROJECT LIMITS, AS DETERMINED BY THE ENGINEER, SHALL BE REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
9. SOME BROOMING MAY BE REQUIRED FOR INSTALLATION OF SIDESTREET STOPBARS. BROOMING SHALL BE INCIDENTAL TO ITEM 711-35-241.
10. SIGNAL MAST ARMS SHOWN ARE FOR INFORMATION ONLY. FOR EXACT LOCATIONS, SEE SIGNALIZATION PLANS.
11. FOR ALL PAVEMENT MARKINGS AND MESSAGES ON BUS LANES, SEE DETAIL No. 1 ON SHEET LD-15.
12. FOR ALL SIGNS MOUNTED ON STREET LIGHT POLES, PLANTER POLES, AND BANNER POLES, SEE LANDSCAPE AND HARDSCAPE PLANS FOR LOCATIONS.
13. THE CONTRACTOR SHALL PAINT ALL POLES, POSTS, BACK OF SIGNS, AND MOUNTING HARDWARE PER SPECIAL PROVISION.
14. INTERNALLY ILLUMINATED SIGNS SHALL BE SOUTHERN MANUFACTURING MODEL NO. FF-LLS-6-800-2-BF OR APPROVED EQUAL AND SHALL ALSO BE FACTORY PAINTED COLOR TO BE SUPPLIED BY THE ENGINEER.
15. REFLECTIVE PAVEMENT MARKERS SHALL BE PLACED PER S-24.
16. SEE HARDSCAPE DETAIL No. 1 ON SHEET LD-9 FOR SPACING OF THE CERAMIC PAVEMENT MARKERS.
17. ALL SIGN POSTS AND MOUNTING HARDWARE SHALL BE PER INDEX No. 11860 & 11862. SEE SPECIAL PROVISIONS FOR ADDITIONAL CAPS ON TOP OF POLES.

REVISIONS

DATE	BY	DESCRIPTION

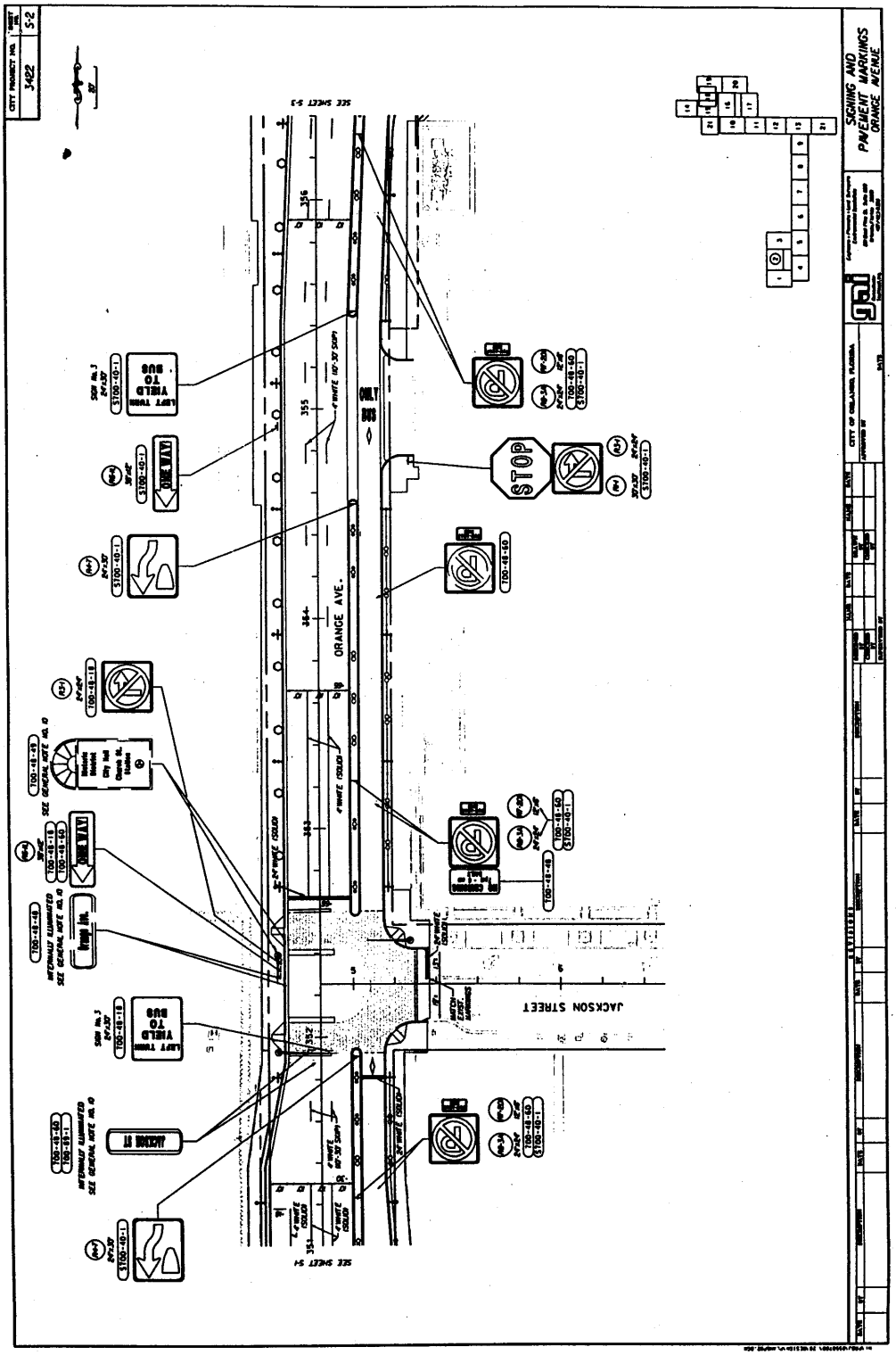
DESIGNED BY
DRAWN BY
CHECKED BY
SURVEYED BY

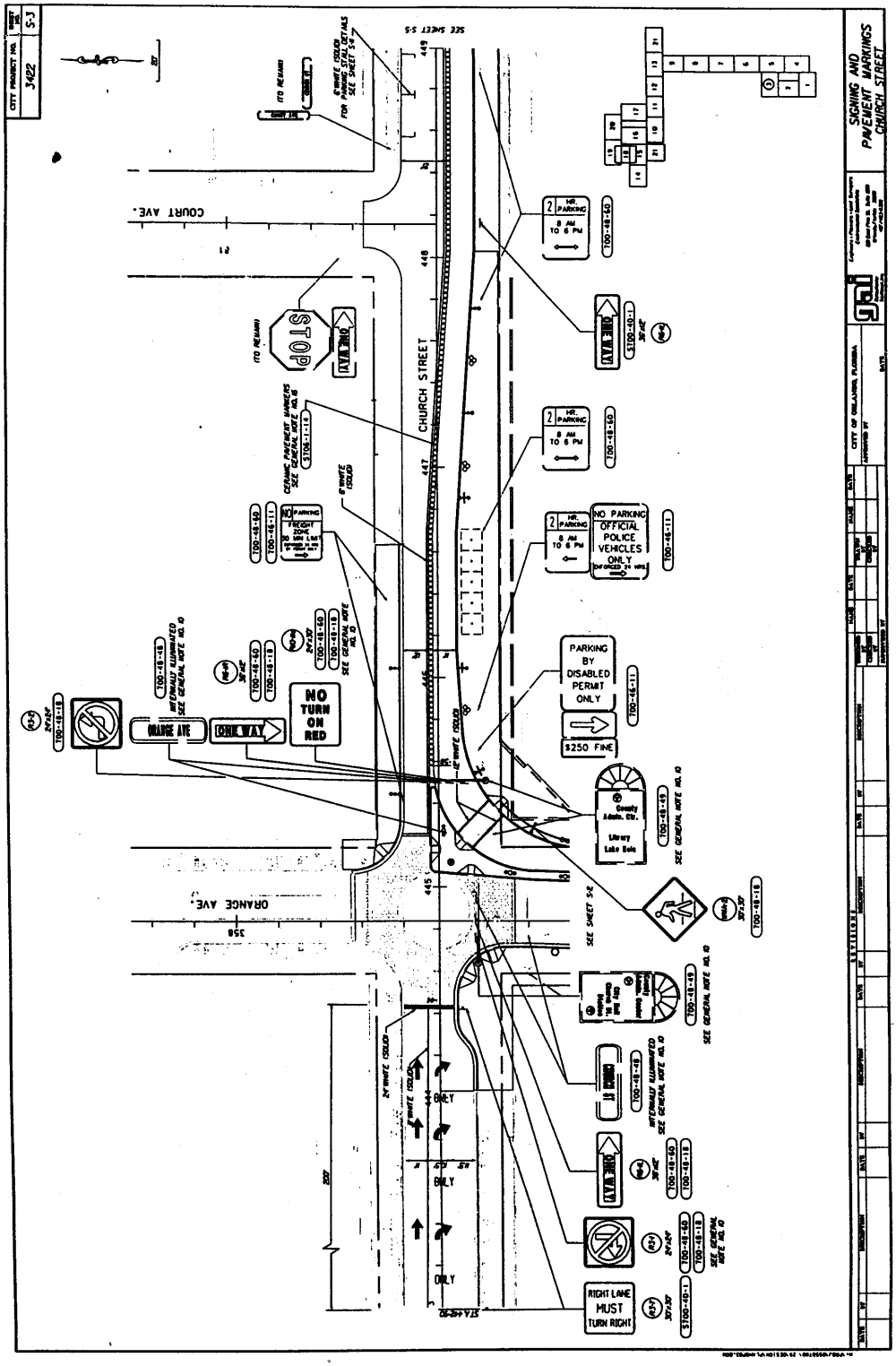
NAME	DATE

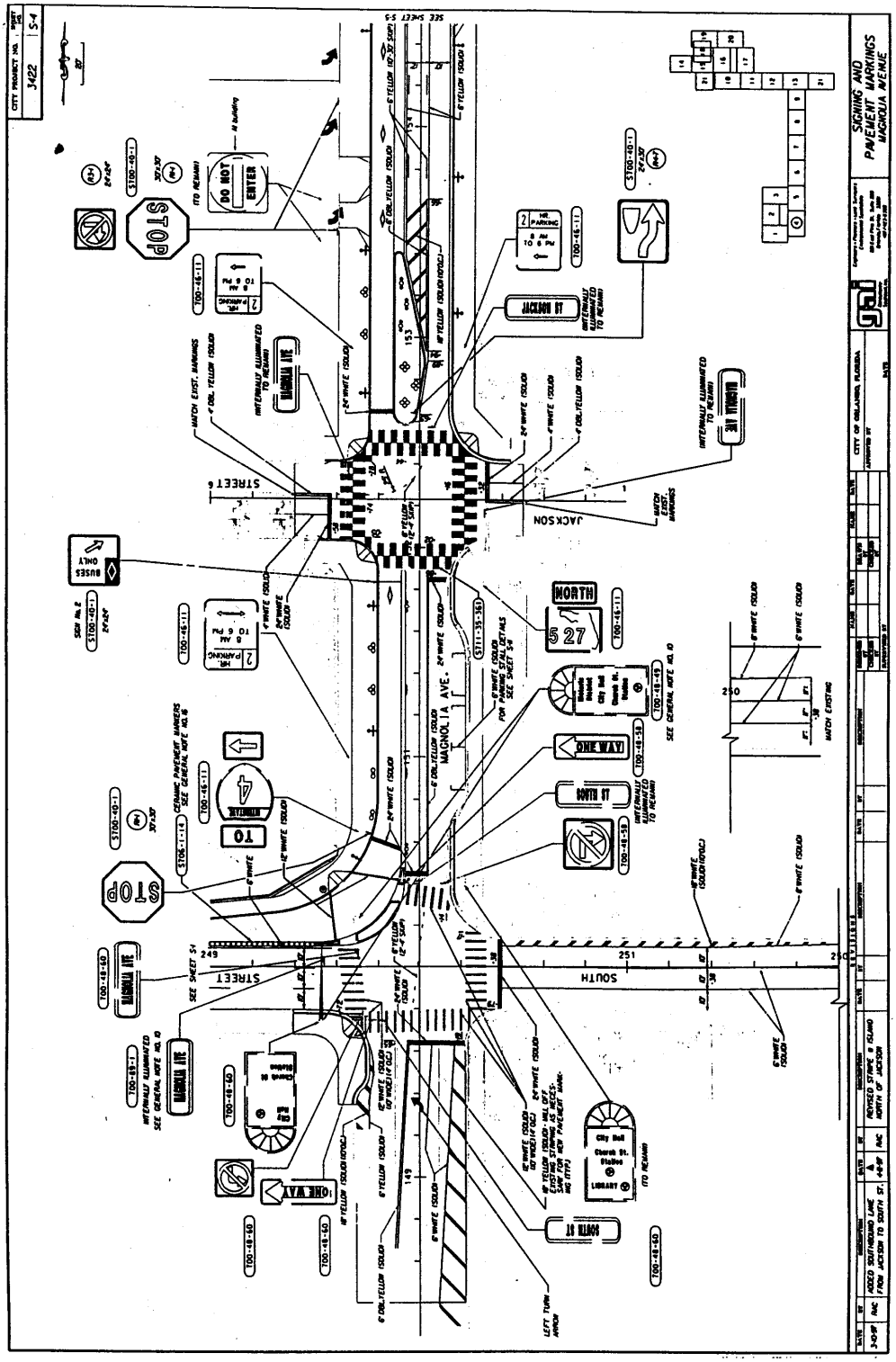
CITY OF ORLANDO, FLORIDA
APPROVED BY
DATE

gai Consultants

SIGNING AND PAVEMENT MARKINGS SOUTH STREET


SIGNING AND PAVEMENT MARKINGS ORANGE AVENUE
CITY PROJECT NO. 3422
SHEET S-2
ORANGE AVE.
JACKSON STREET
ONLY BUS
STOP
LEFT TURN YIELD TO BUS
ONE WAY
JACKSON ST
SEE SHEET S-3
SEE SHEET S-1
CITY OF MELBOURNE, FLORIDA


SIGNING AND PAVEMENT MARKINGS CHURCH STREET
CITY PROJECT NO. 3422
SHEET NO. S-3
CITY OF ORLANDO, FLORIDA
COURT AVE.
CHURCH STREET
ORANGE AVE.
STOP
ONE WAY
2 HR PARKING 8 AM TO 6 PM
NO PARKING OFFICIAL POLICE VEHICLES ONLY
PARKING BY DISABLED PERMIT ONLY
$250 FINE
NO TURN ON RED
RIGHT LANE MUST TURN RIGHT
ONLY
SEE SHEET S-5
SEE SHEET S-6
SEE GENERAL NOTE NO. 10
INTERNALLY ILLUMINATED SEE GENERAL NOTE NO. 10
6" WHITE SOLID
24" WHITE SOLID
12" WHITE SOLID
EXISTING PAVEMENT MARKINGS SEE GENERAL NOTE NO. 10
(TO REMAIN)
6" WHITE SOLID FOR PARKING STALL DETAILS SEE SHEET S-4


SIGNING AND PAVEMENT MARKINGS MAGNOLIA AVENUE
CITY PROJECT NO. 3422
SHEET S-4
CITY OF ORLANDO, FLORIDA
MAGNOLIA AVE.
STREET 6
JACKSON
STREET 5
SOUTH
NORTH
STOP
DO NOT ENTER
ONE WAY
BUSES ONLY
JE JACKSON
NORTH ST
SOUTH ST
LIBRARY
SEE SHEET S-5
SEE SHEET S-3
SEE GENERAL NOTE NO. 10
SEE GENERAL NOTE NO. 11
SEE GENERAL NOTE NO. 12
SEE GENERAL NOTE NO. 13
SEE GENERAL NOTE NO. 14
SEE GENERAL NOTE NO. 15
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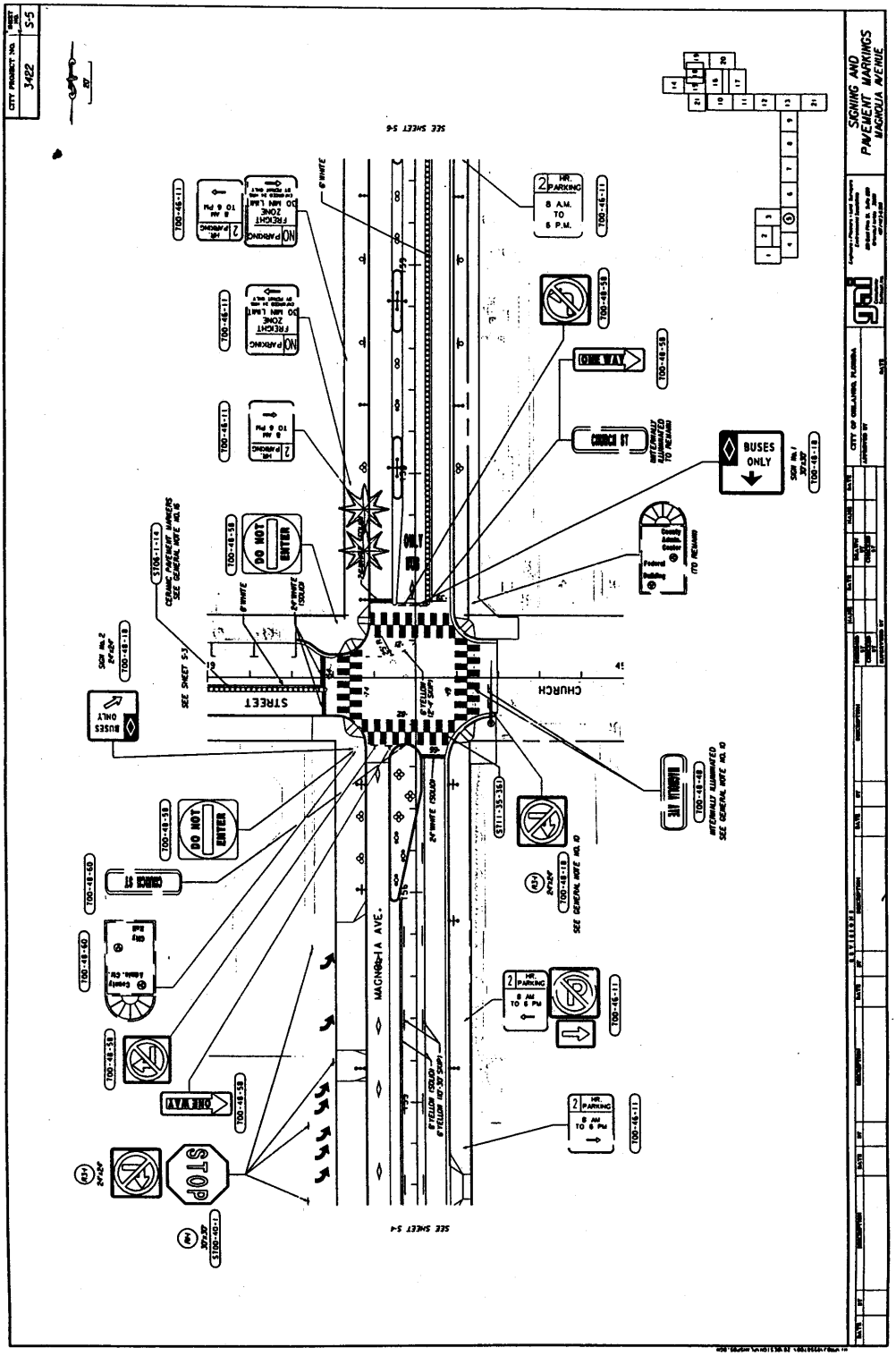
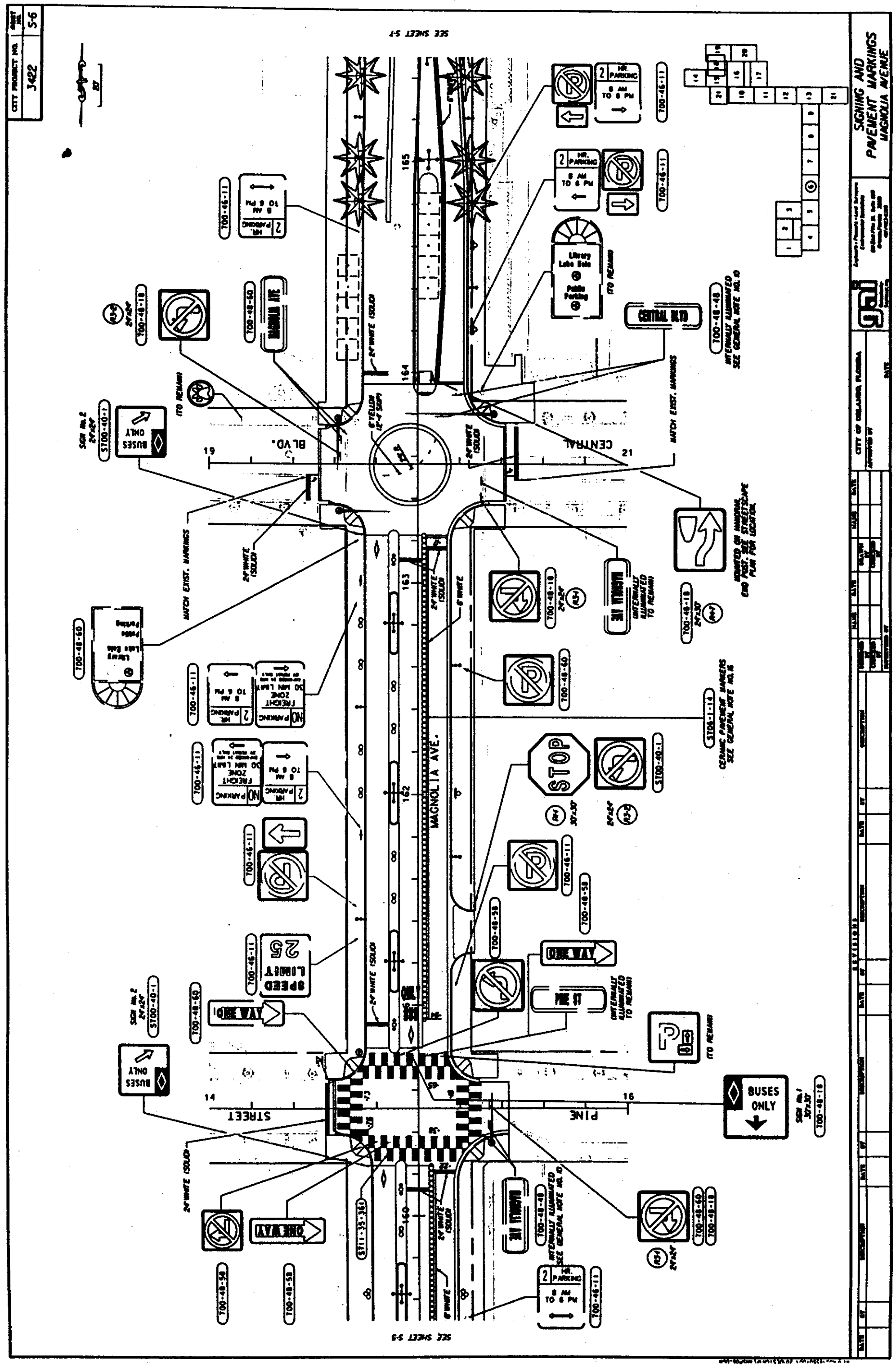
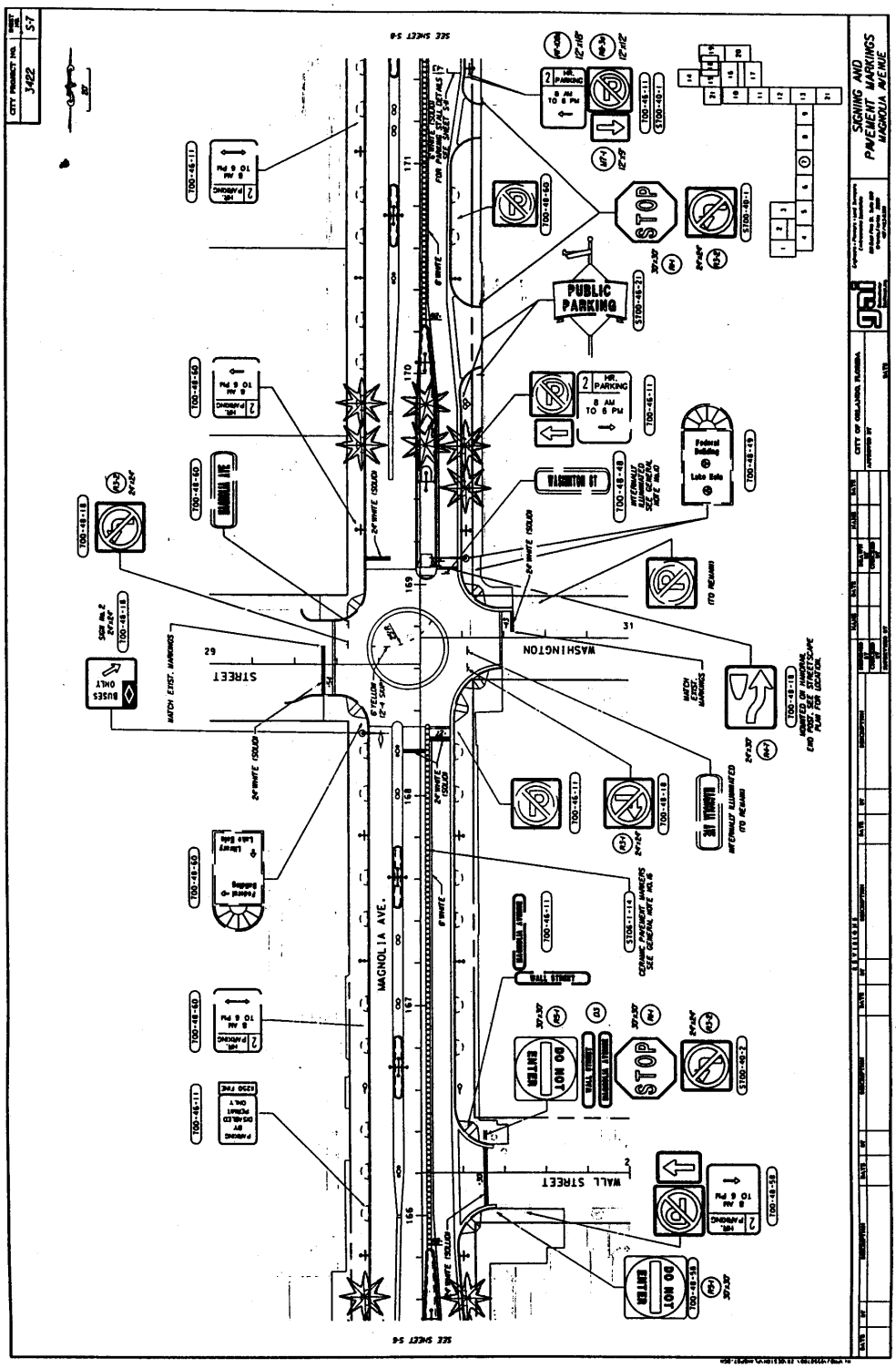
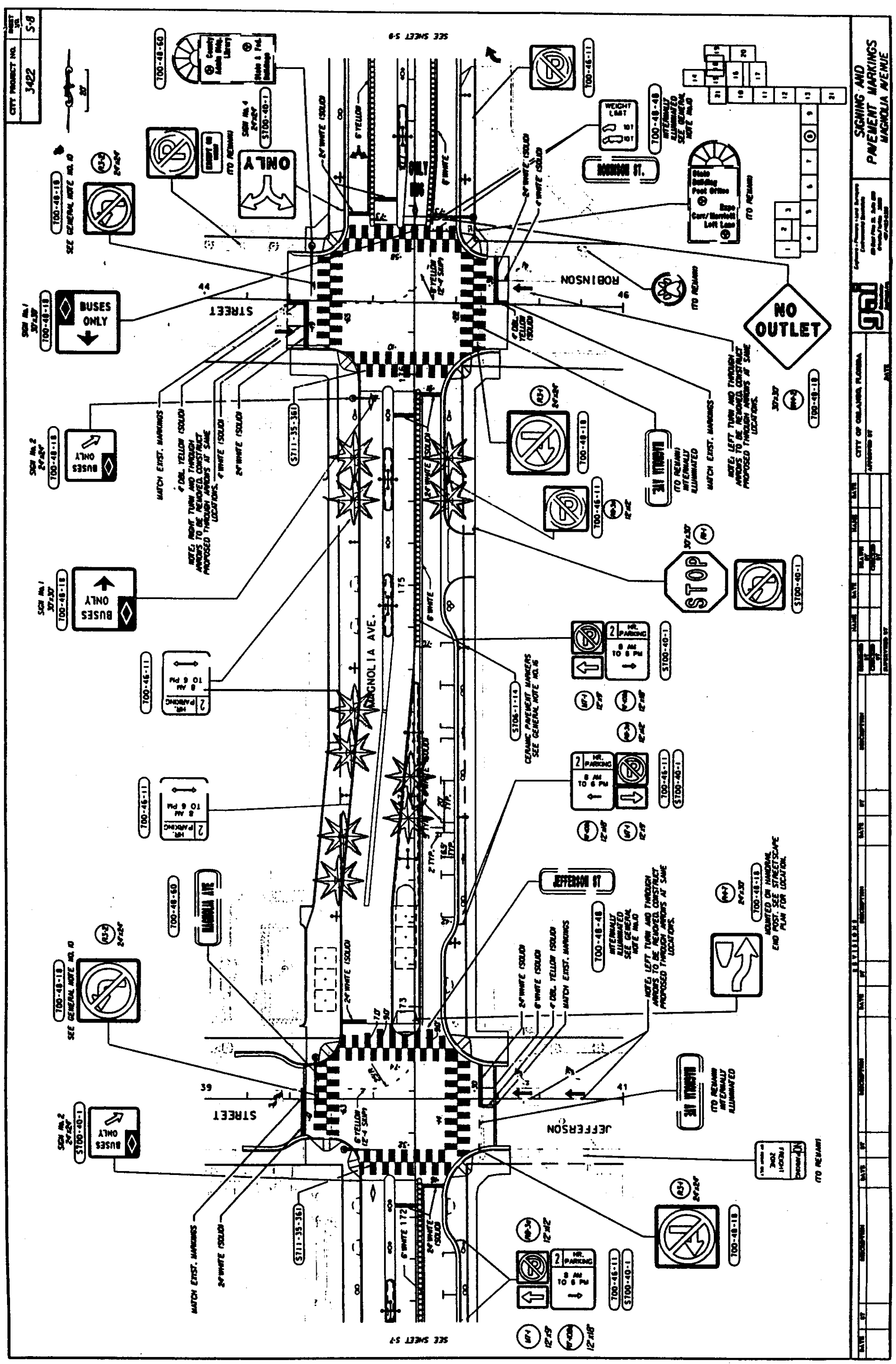
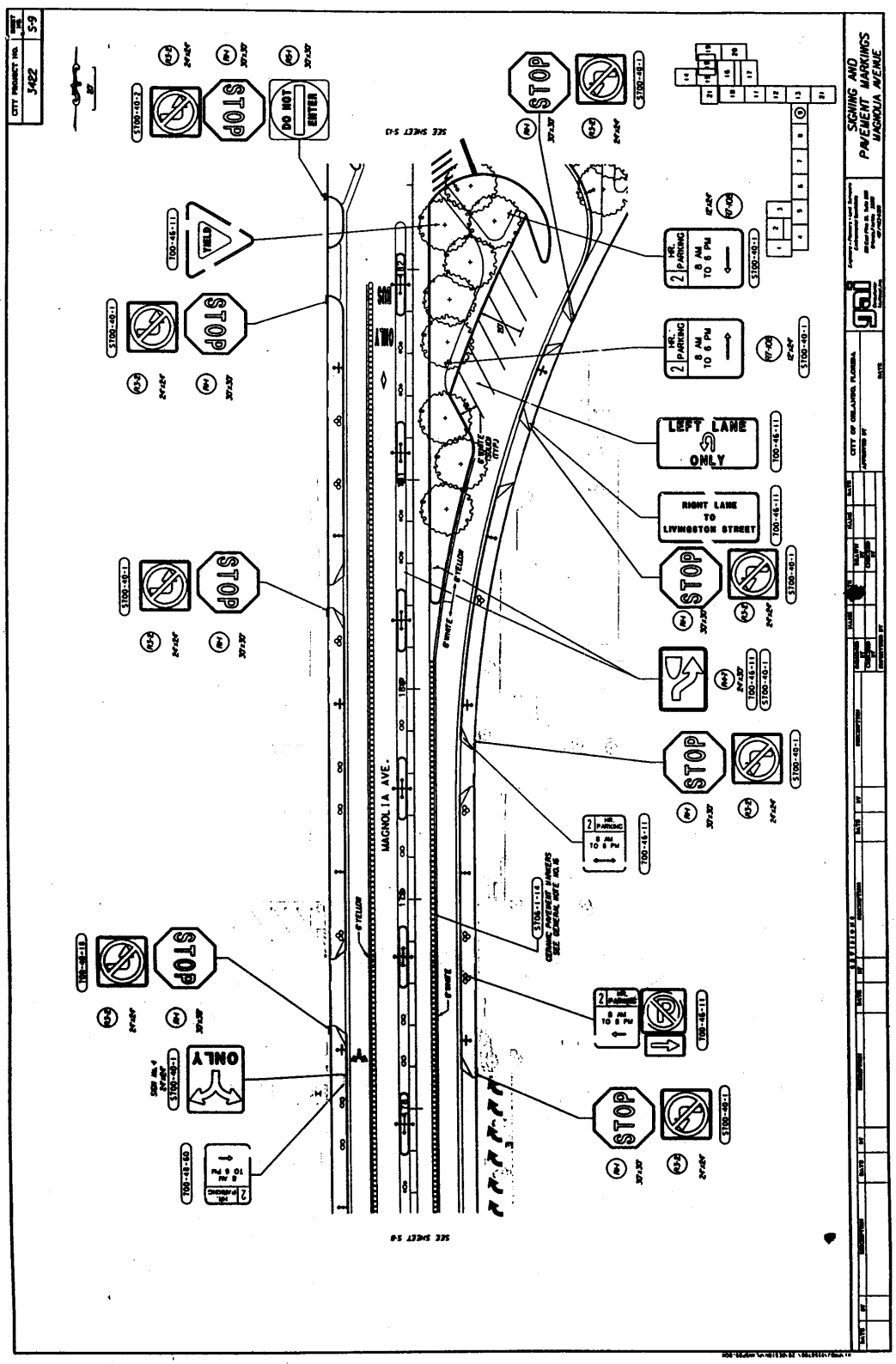
SEE GENERAL NOTE NO. 100

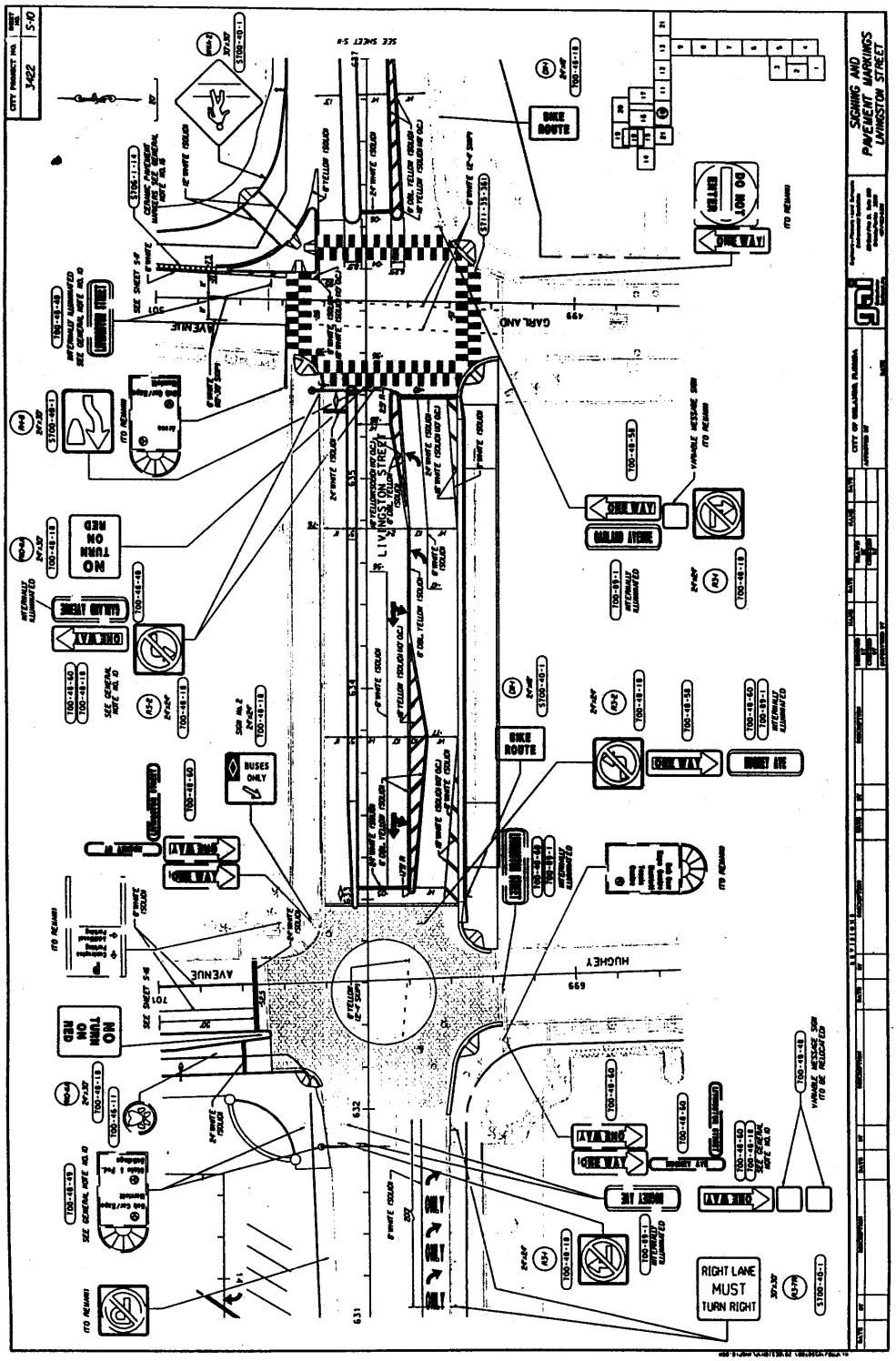

SIGNING AND PAVEMENT MARKINGS MAGNOLIA AVENUE
CITY PROJECT NO. 3422
SHEET NO. S-5
CITY OF HIALEAH, FLORIDA
MAGNOLIA AVE.
CHURCH
STREET
CHURCH ST
ONE WAY
DO NOT ENTER
BUSES ONLY
STOP
2 HR. PARKING 8 A.M. TO 6 P.M.
NO PARKING FREIGHT ZONE
SEE SHEET S-4
SEE SHEET S-1
SEE GENERAL NOTE NO. 6
SEE GENERAL NOTE NO. 10
INTERNALLY ILLUMINATED TO REMAIN
6" WHITE
24" WHITE SOLID
6" YELLOW DOUBLE SOLID

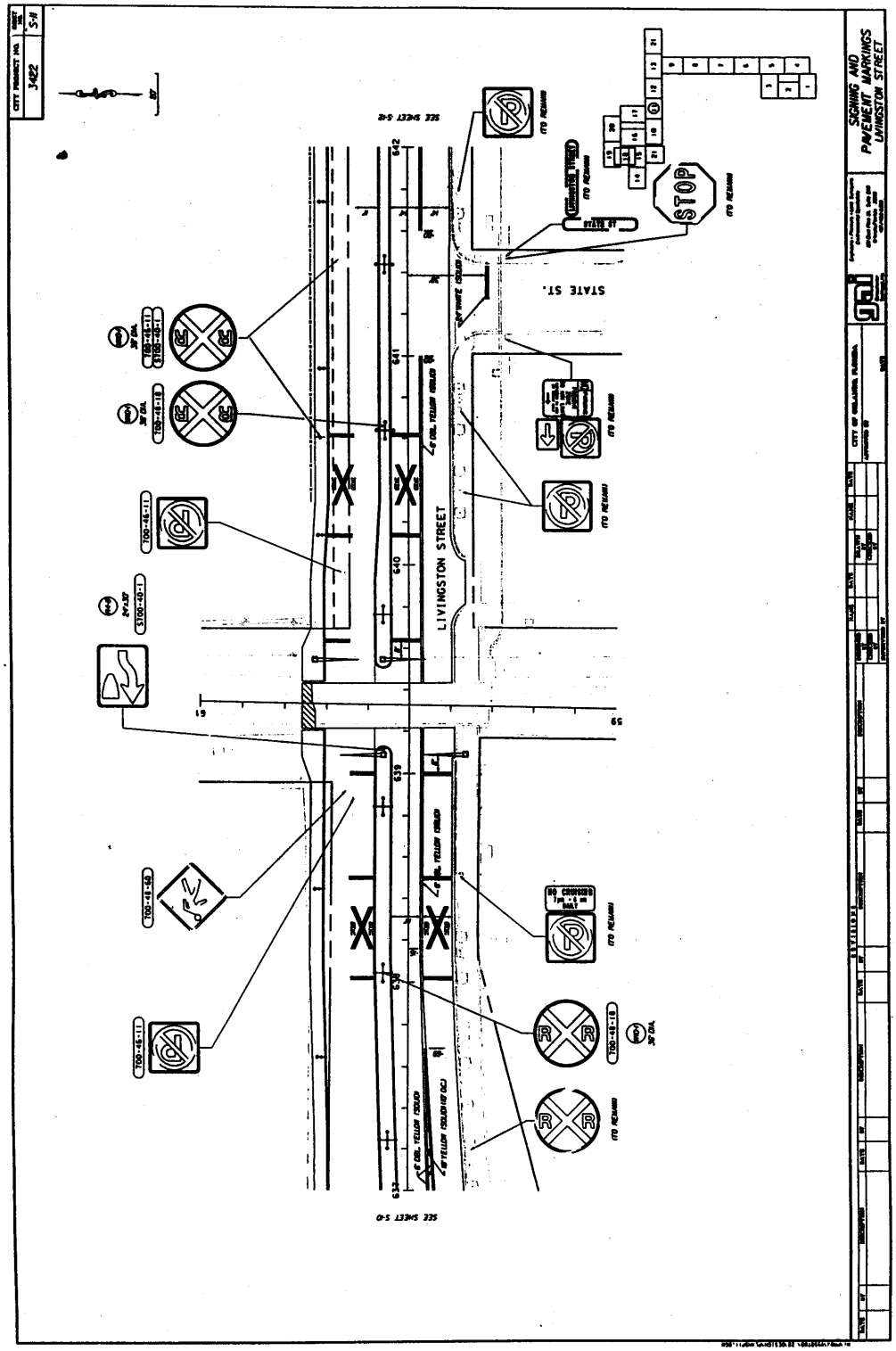

SIGNING AND PAVEMENT MARKINGS
MAGNOLIA AVENUE
CITY OF ORLANDO, FLORIDA
CITY PROJECT NO.
3422
S-6
SEE SHEET S-7
SEE SHEET S-5
MAGNOLIA AVE.
CENTRAL
BLVD.
PINE
STREET
STOP
ONE WAY
BUSES ONLY
SPEED LIMIT 25
CENTRAL BLVD
PINE ST


SIGNING AND PAVEMENT MARKINGS
MAGNOLIA AVENUE
CITY PROJECT NO. 3422
SHEET NO. S-7
CITY OF ORLANDO, FLORIDA
MAGNOLIA AVE.
WASHINGTON STREET
WALL STREET
PUBLIC PARKING
STOP
DO NOT ENTER
BUSES ONLY
2 HR. PARKING 8 AM TO 6 PM
SEE SHEET S-6
SEE SHEET S-8
24" WHITE (SOLID)
6" WHITE
6" YELLOW
MATCH EXIST. MARKINGS
INTERNALLY ILLUMINATED
TO REMAIN
CERAMIC PAVEMENT MARKERS SEE GENERAL NOTE NO. 6
gai


NO OUTLET
STOP
BUSES ONLY
ONLY
ROBINSON
STREET
JEFFERSON
MAGNOLIA AVE.


SIGNING AND PAVEMENT MARKINGS MAGNOLIA AVENUE
CITY PROJECT NO. 3422
SHEET NO. 5-9
CITY OF ORLANDO, FLORIDA
MAGNOLIA AVE.
STOP
DO NOT ENTER
YIELD
ONLY
LEFT LANE ONLY
RIGHT LANE TO LIVINGSTON STREET
2 HR. PARKING 8 AM TO 6 PM
SEE SHEET 5-10
SEE SHEET 5-8


SIGNING AND PAVEMENT MARKINGS LIVINGSTON STREET
LIVINGSTON STREET
ONE WAY
BIKE ROUTE
BUSES ONLY
NO TURN ON RED
RIGHT LANE MUST TURN RIGHT
DO NOT ENTER
GARLAND AVENUE
HUGHEY AVENUE


SIGNING AND PAVEMENT MARKINGS LIVINGSTON STREET
CITY PROJECT NO. 3422
SHEET 5-9
LIVINGSTON STREET
STATE ST.
STOP
SEE SHEET S-8
SEE SHEET S-10
TO REMAIN
R1-1
R3-17
R3-18
W16-7P
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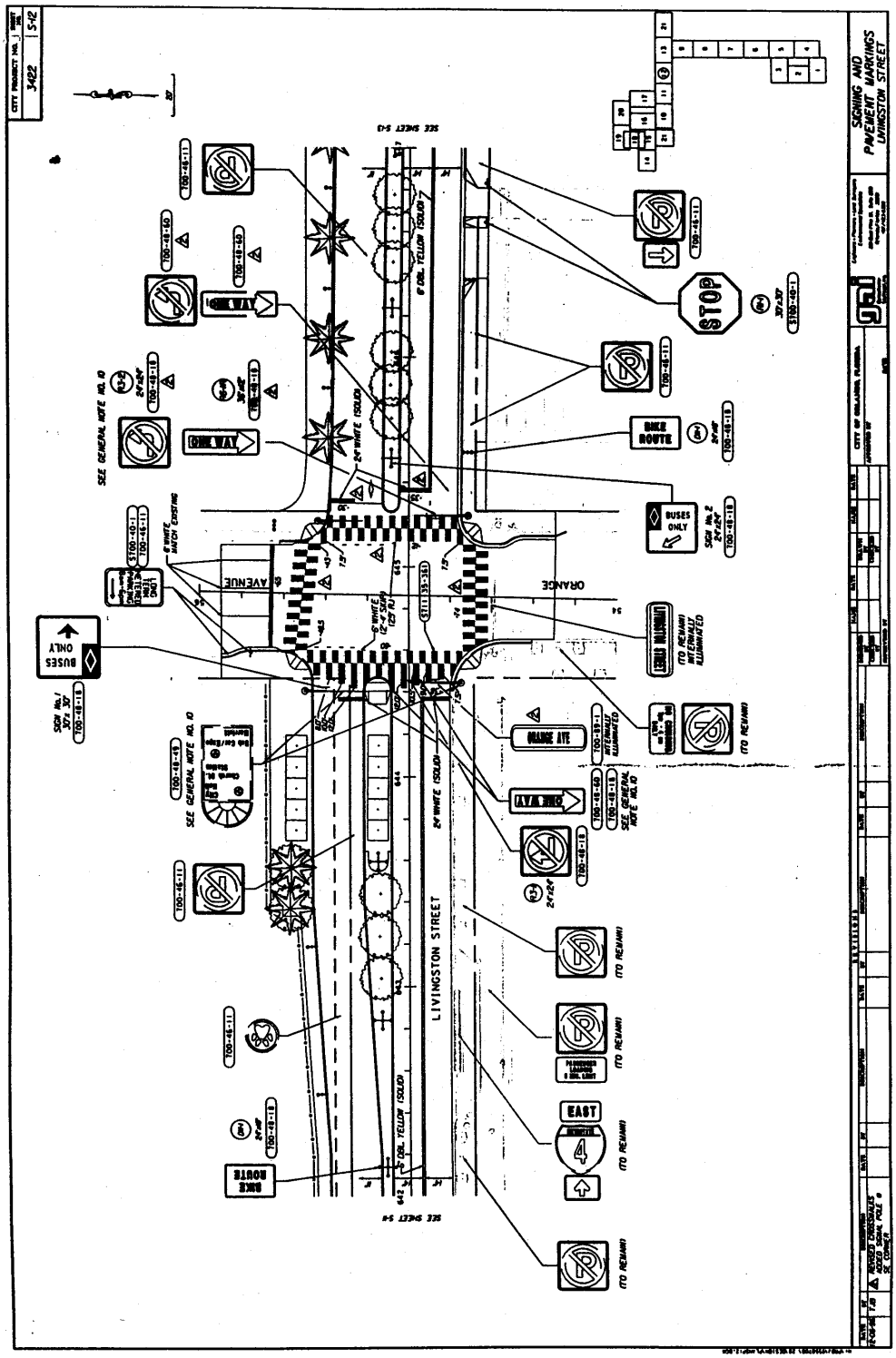
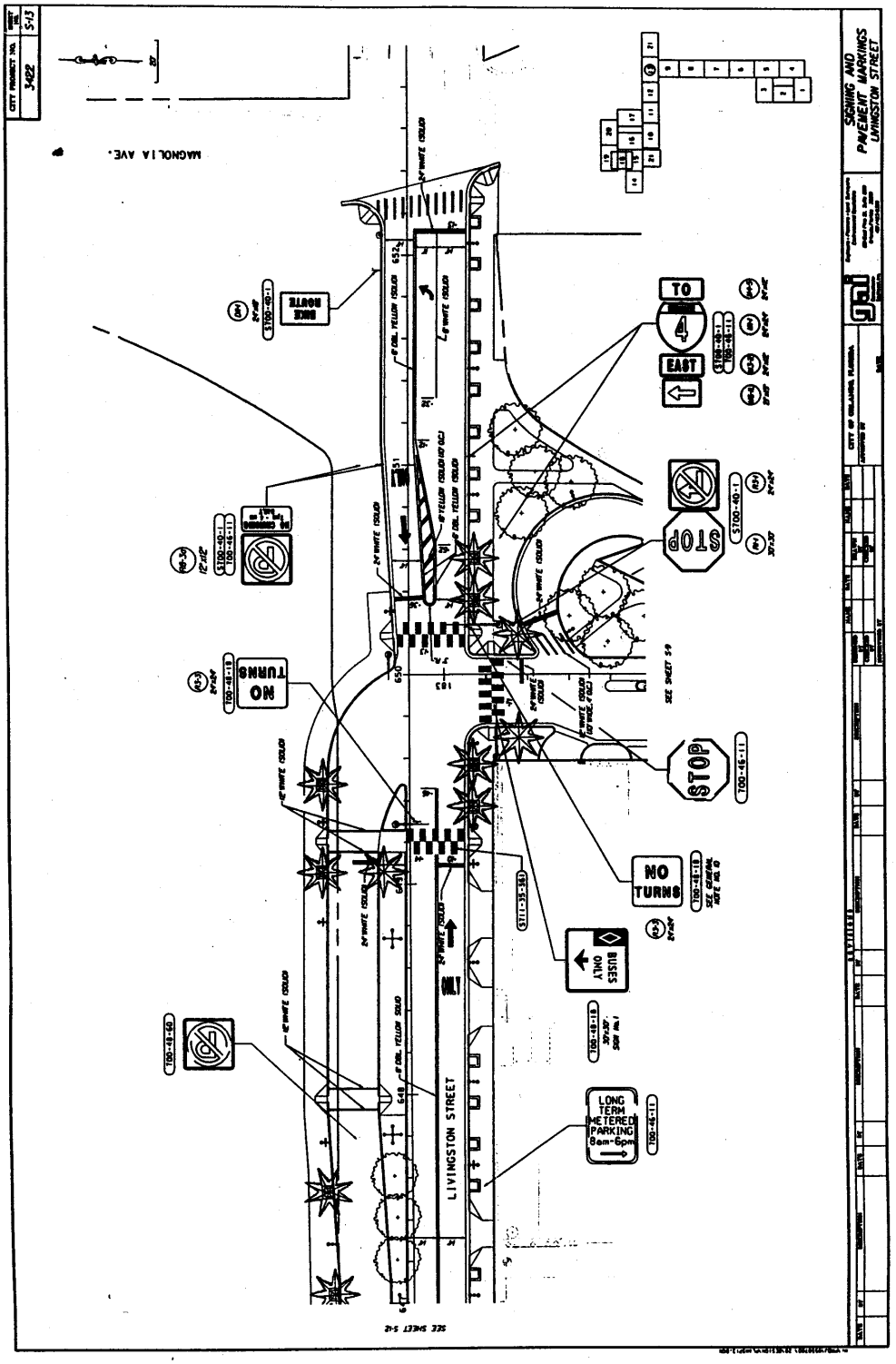
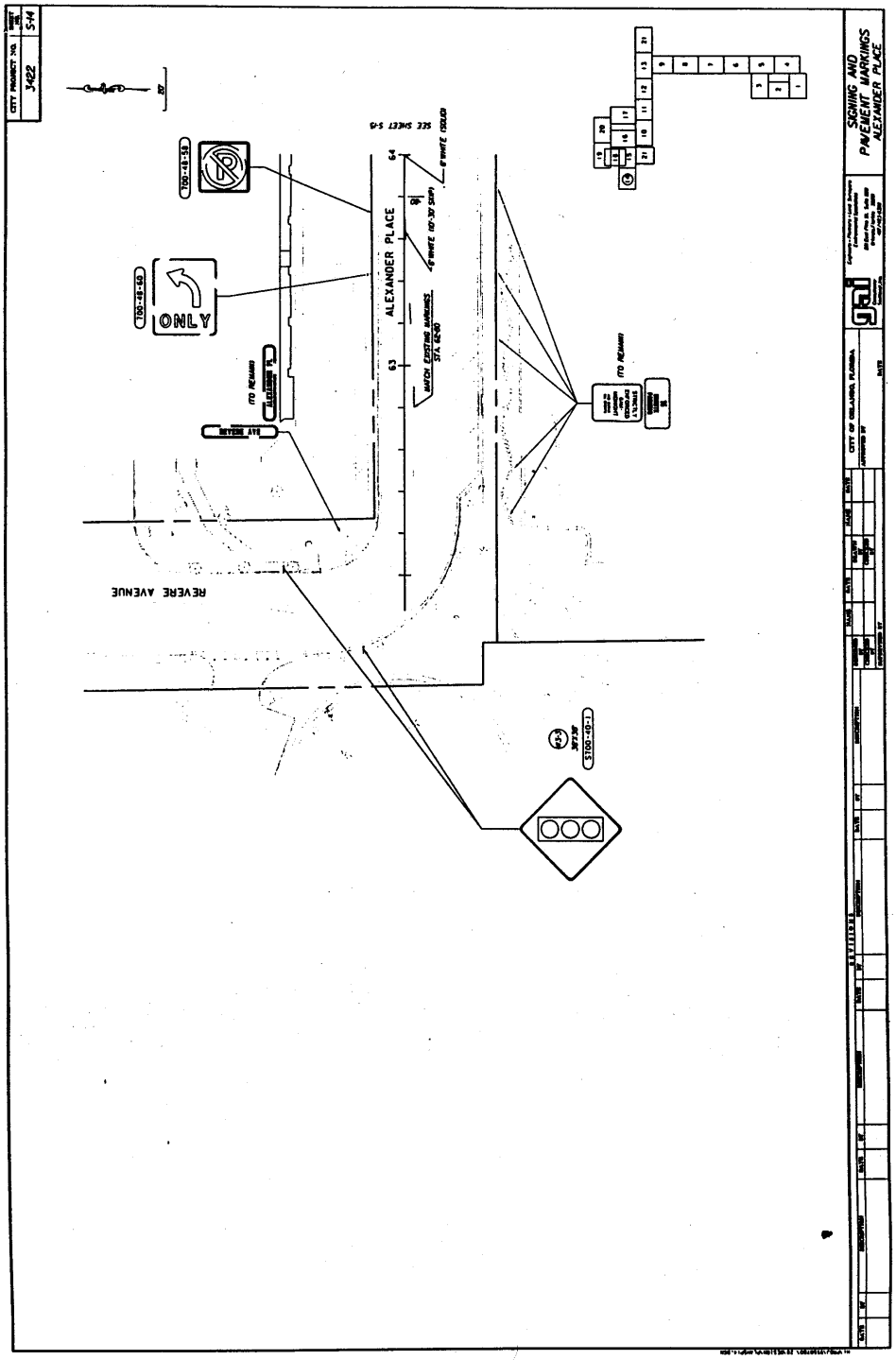
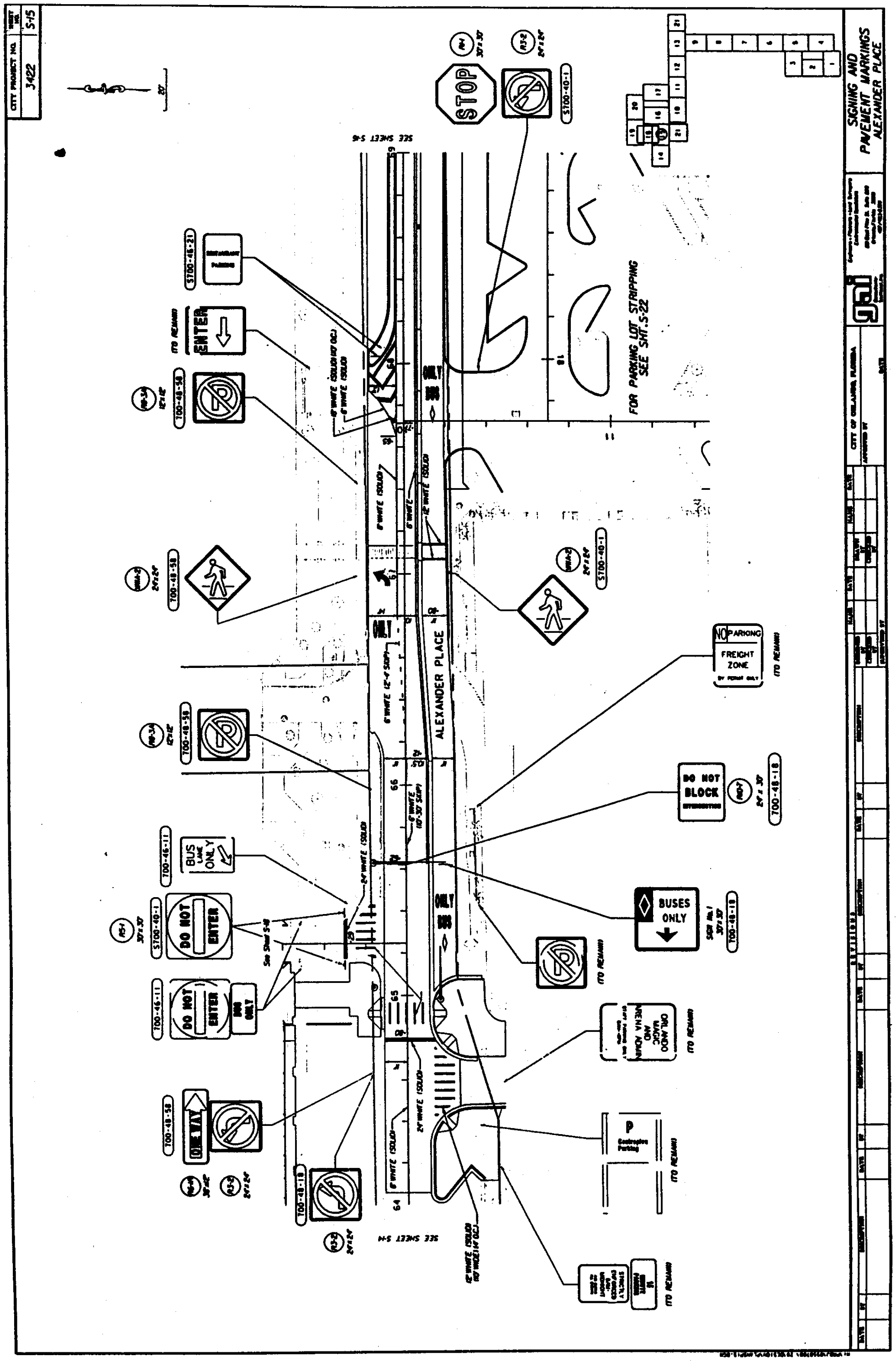
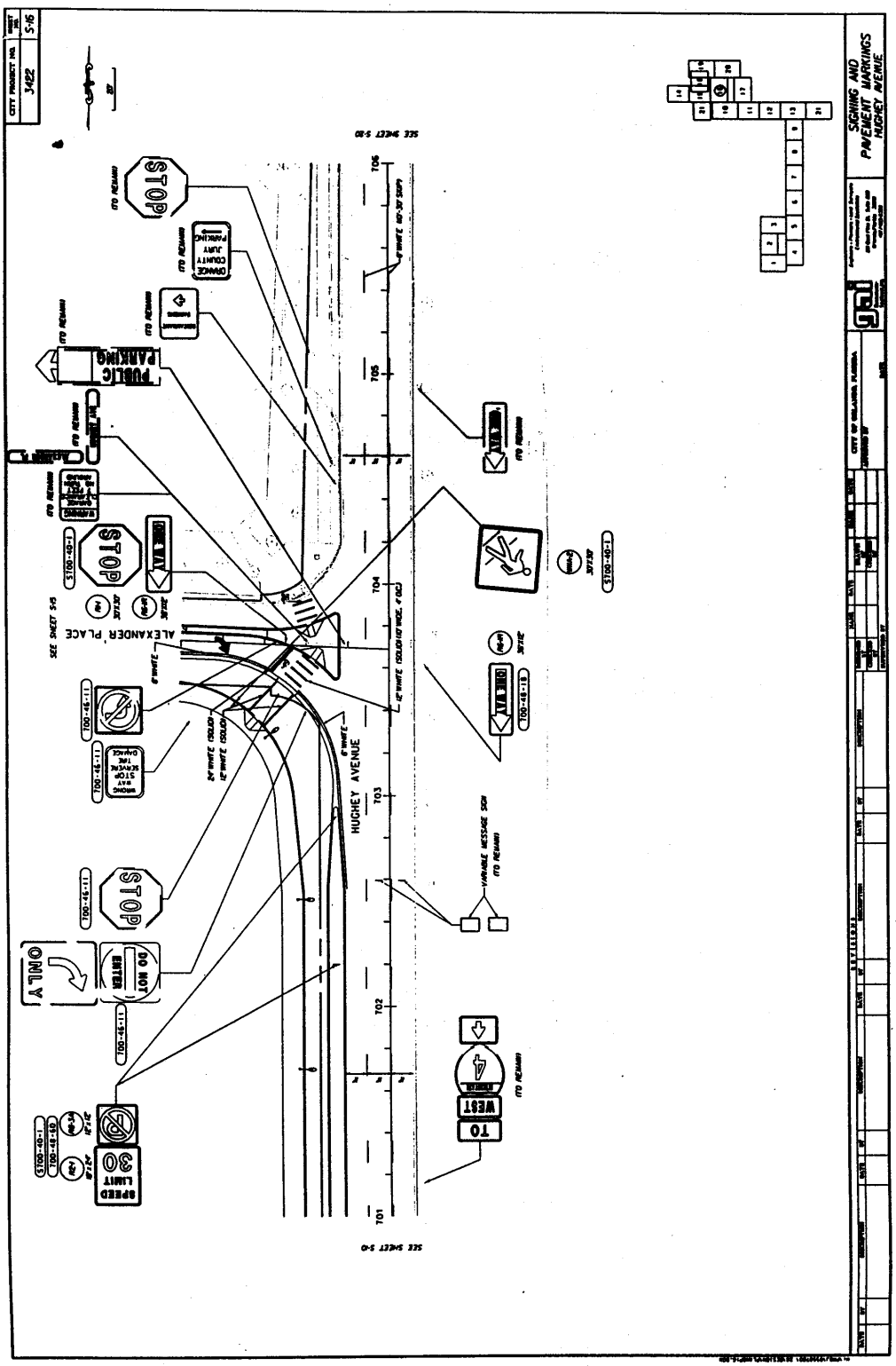

SIGNING AND PAVEMENT MARKINGS LIVINGSTON STREET
LIVINGSTON STREET
ORANGE AVENUE
STOP
BUSES ONLY
BIKE ROUTE
EAST
ONE WAY
(TO REMAIN)

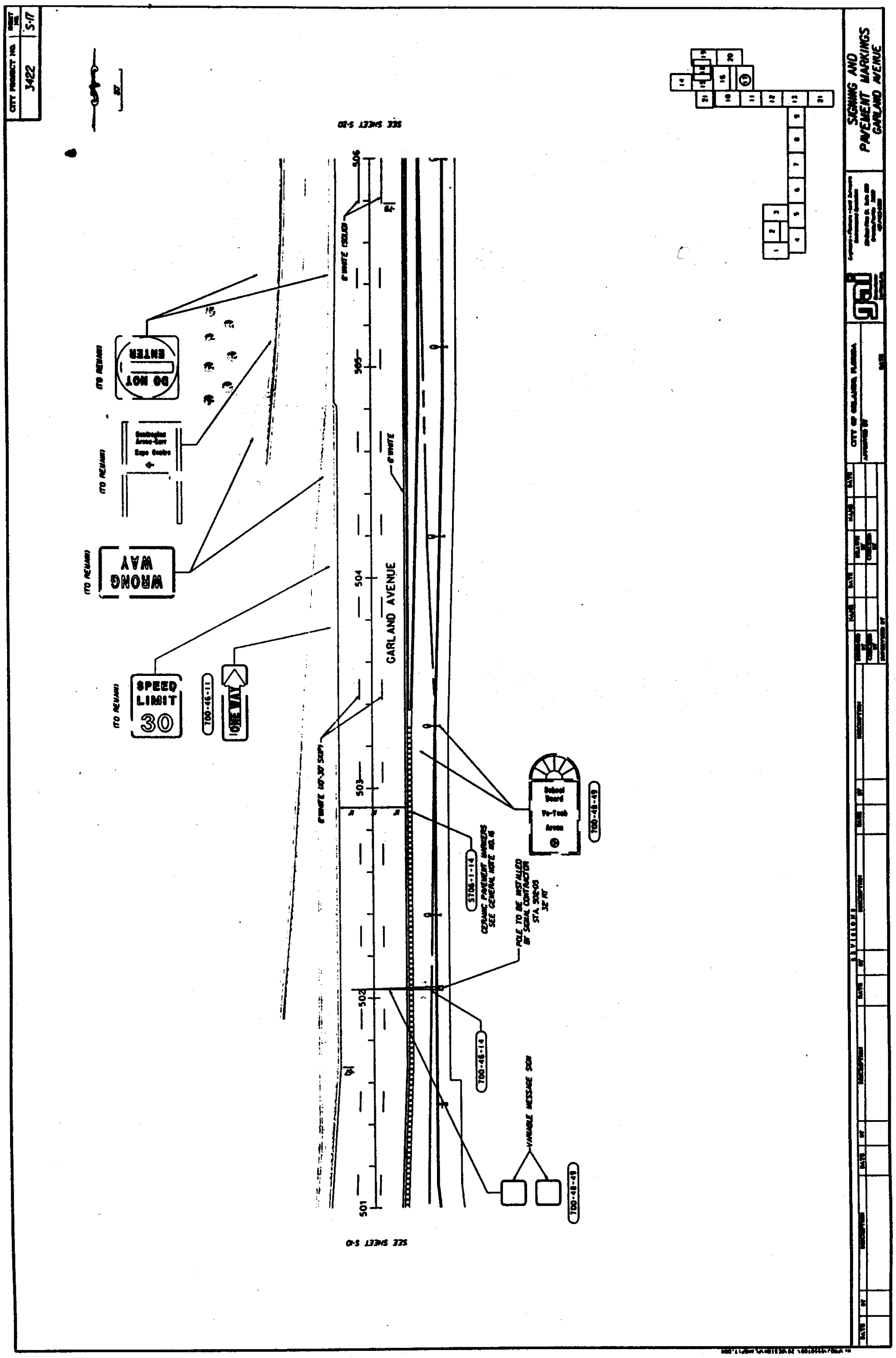

SIGNING AND PAVEMENT MARKINGS LIVINGSTON STREET
CITY PROJECT NO. 3402
SHEET NO. 5-13
MAGNOLIA AVE.
LIVINGSTON STREET
BIKE ROUTE
TO EAST
STOP
NO TURNS
BUSES ONLY
LONG TERM METERED PARKING 8am-6pm
SEE SHEET 5-4
SEE SHEET 5-5

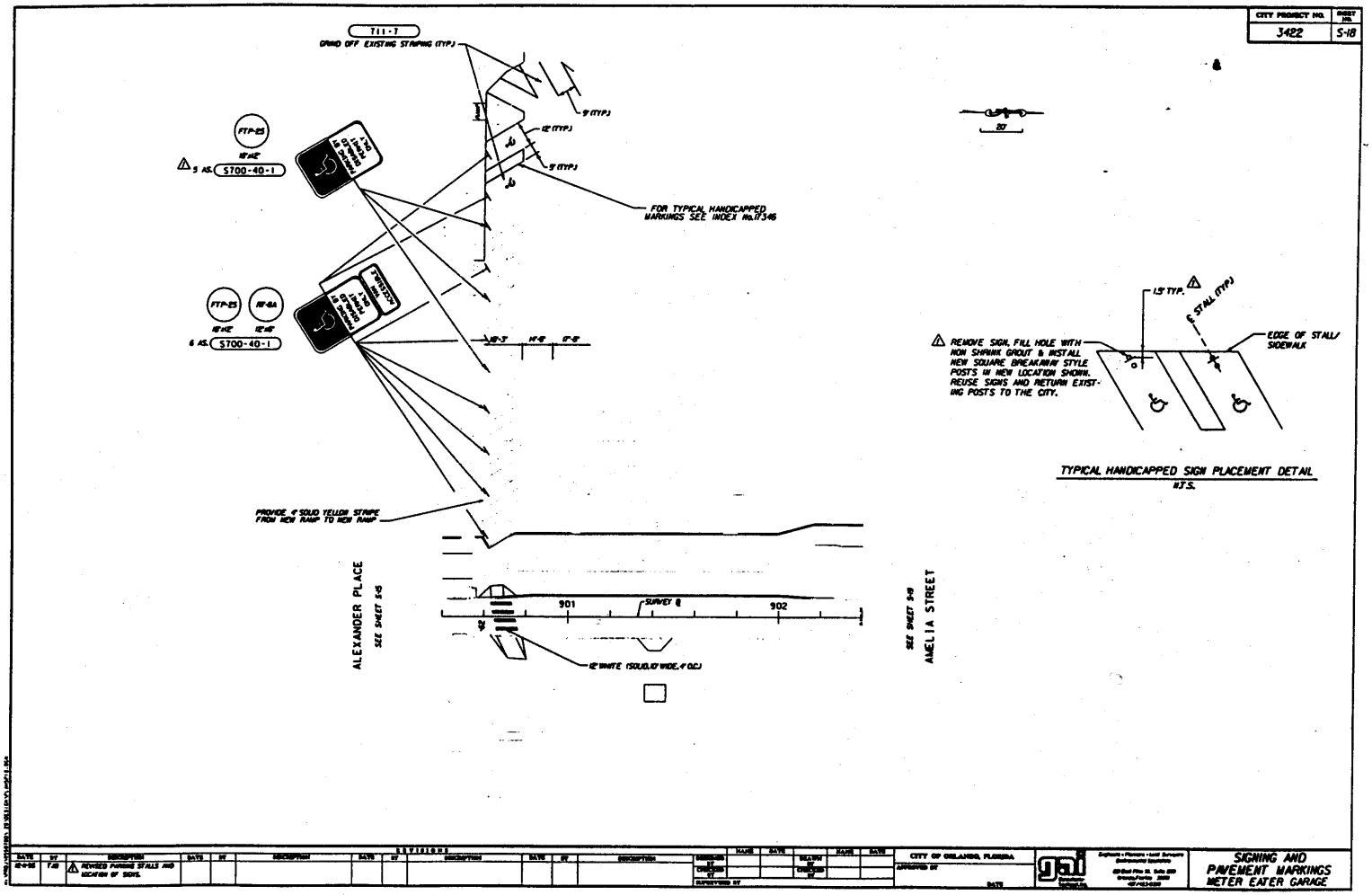

SIGNING AND PAVEMENT MARKINGS ALEXANDER PLACE
CITY PROJECT NO. 3422
SHEET NO. S-14
ALEXANDER PLACE
REVERE AVENUE
ONLY
TO REMAIN
MATCH EXISTING MARKINGS STA 42+00
6" WHITE (SOLID)
6" WHITE (10'-30' SKIP)
CITY OF ORLANDO, FLORIDA

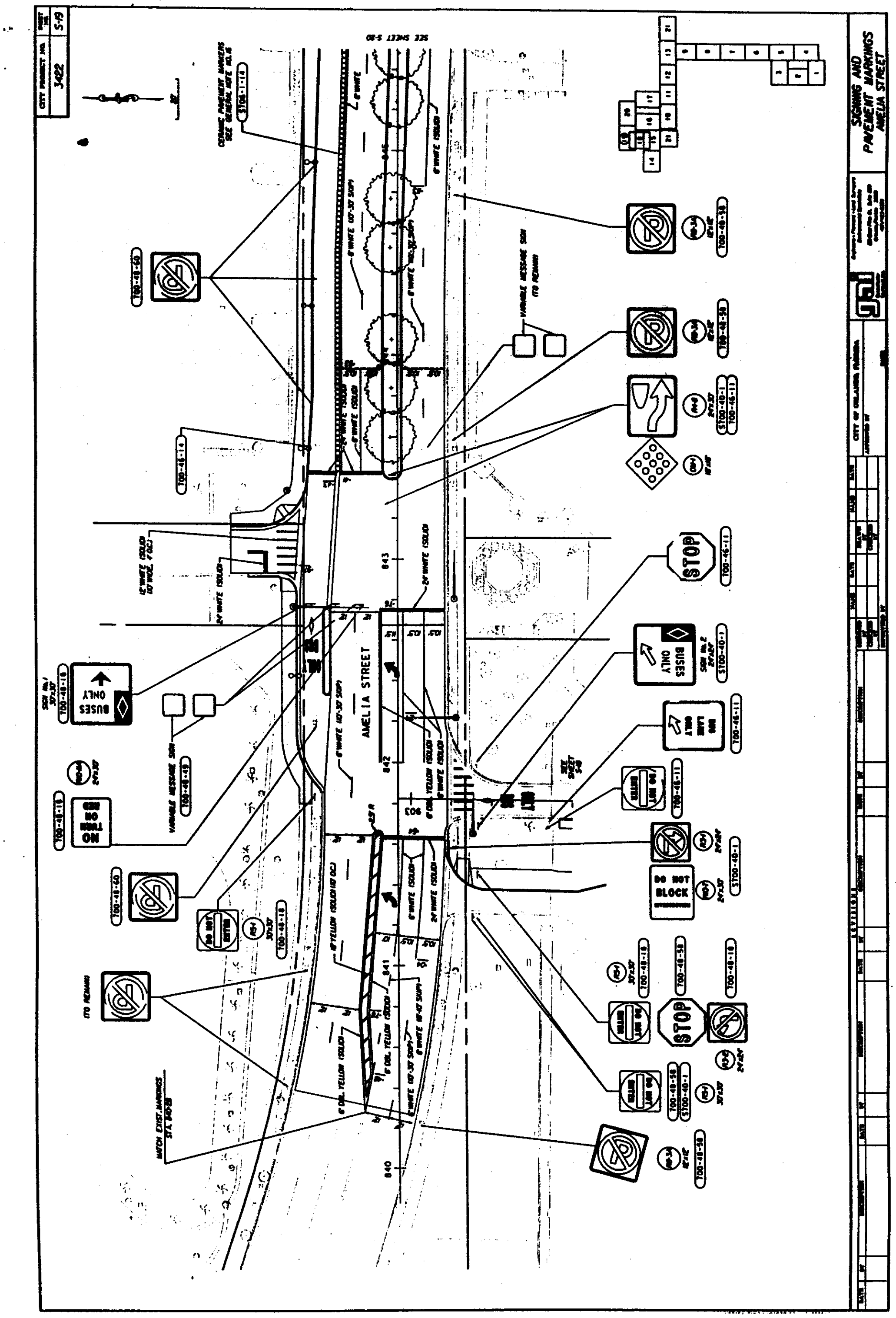


CITY PROJECT NO.
3422
S-15
SIGNING AND PAVEMENT MARKINGS ALEXANDER PLACE
ALEXANDER PLACE
FOR PARKING LOT STRIPPING SEE SHT. S-22
STOP
DO NOT ENTER
BUS LANE ONLY
BUSES ONLY
DO NOT BLOCK
FREIGHT ZONE
ONE WAY
ENTER

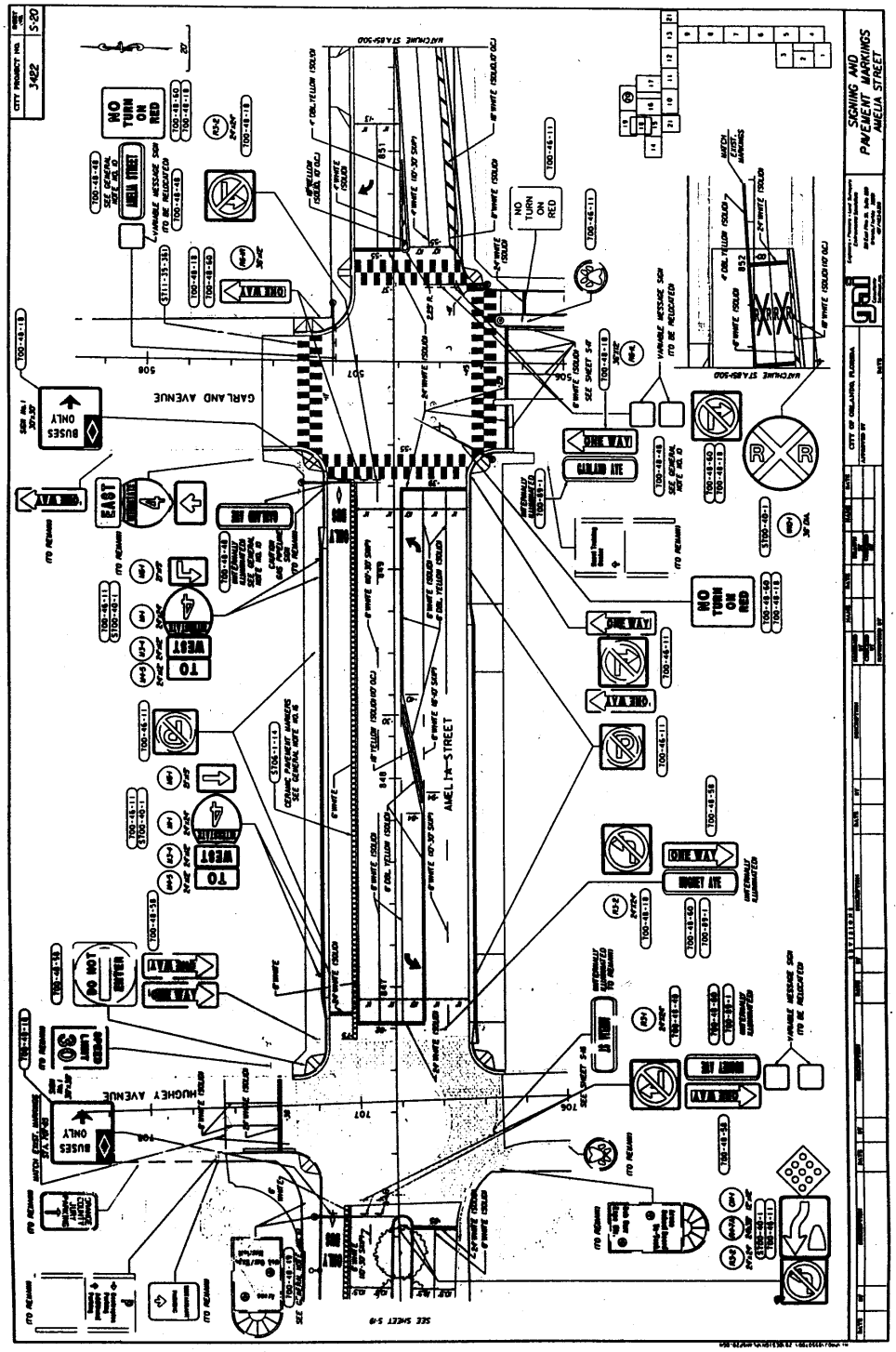

SIGNING AND PAVEMENT MARKINGS HUGHEY AVENUE
CITY PROJECT NO. 3422
SHEET NO. 5-6
HUGHEY AVENUE
ALEXANDER PLACE
SEE SHEET 5-5
SEE SHEET 5-7
STOP
ONLY
DO NOT ENTER
SPEED LIMIT 30
PUBLIC PARKING
ONE WAY
TO WEST
VARIABLE MESSAGE SIGN
TO REMAIN
101
102
103
104
105
106

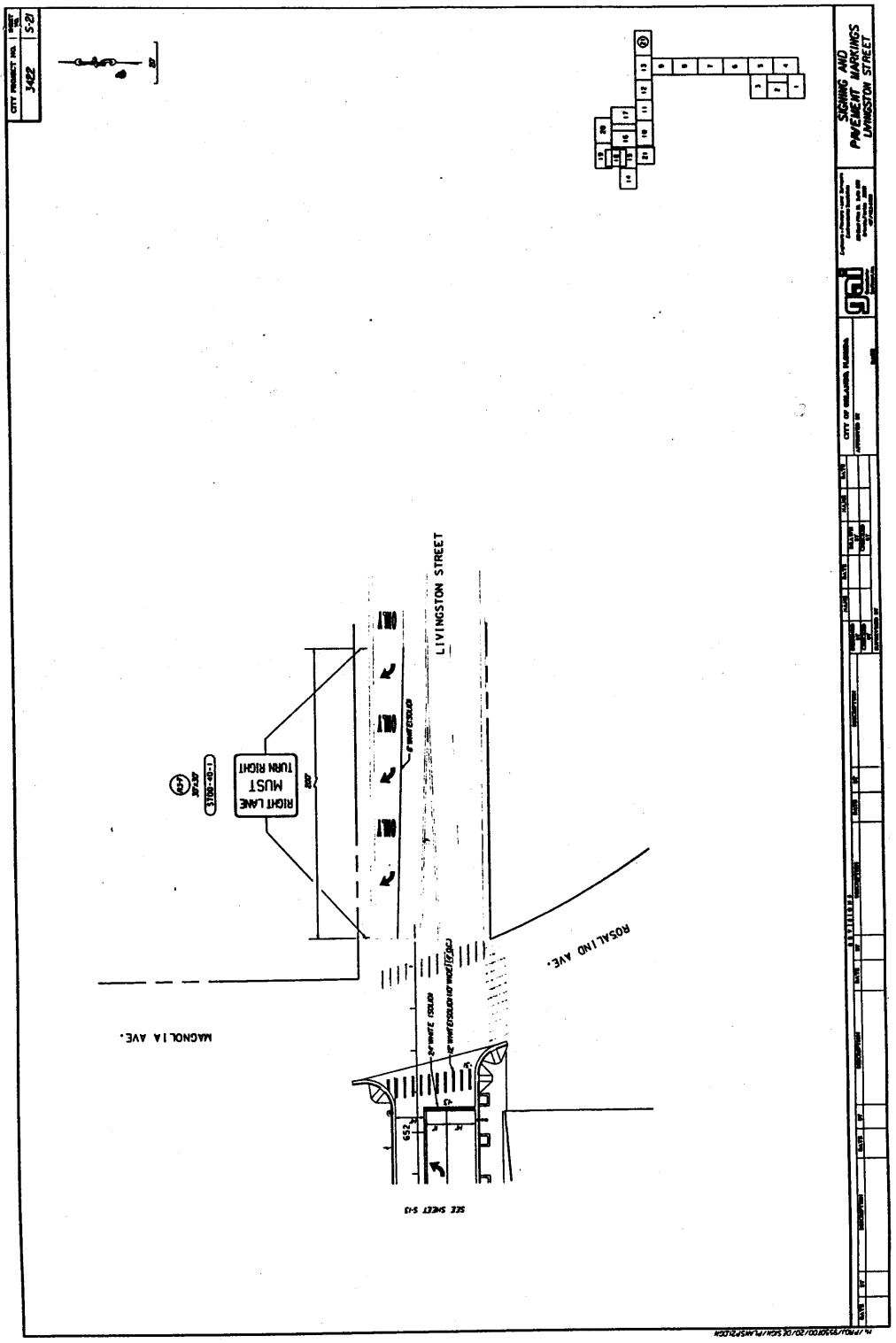

3422
S-17
GARLAND AVENUE
SPEED LIMIT 30
ONE WAY
WRONG WAY
DO NOT ENTER
SIGNING AND PAVEMENT MARKINGS GARLAND AVENUE
501
502
503
504
505
506

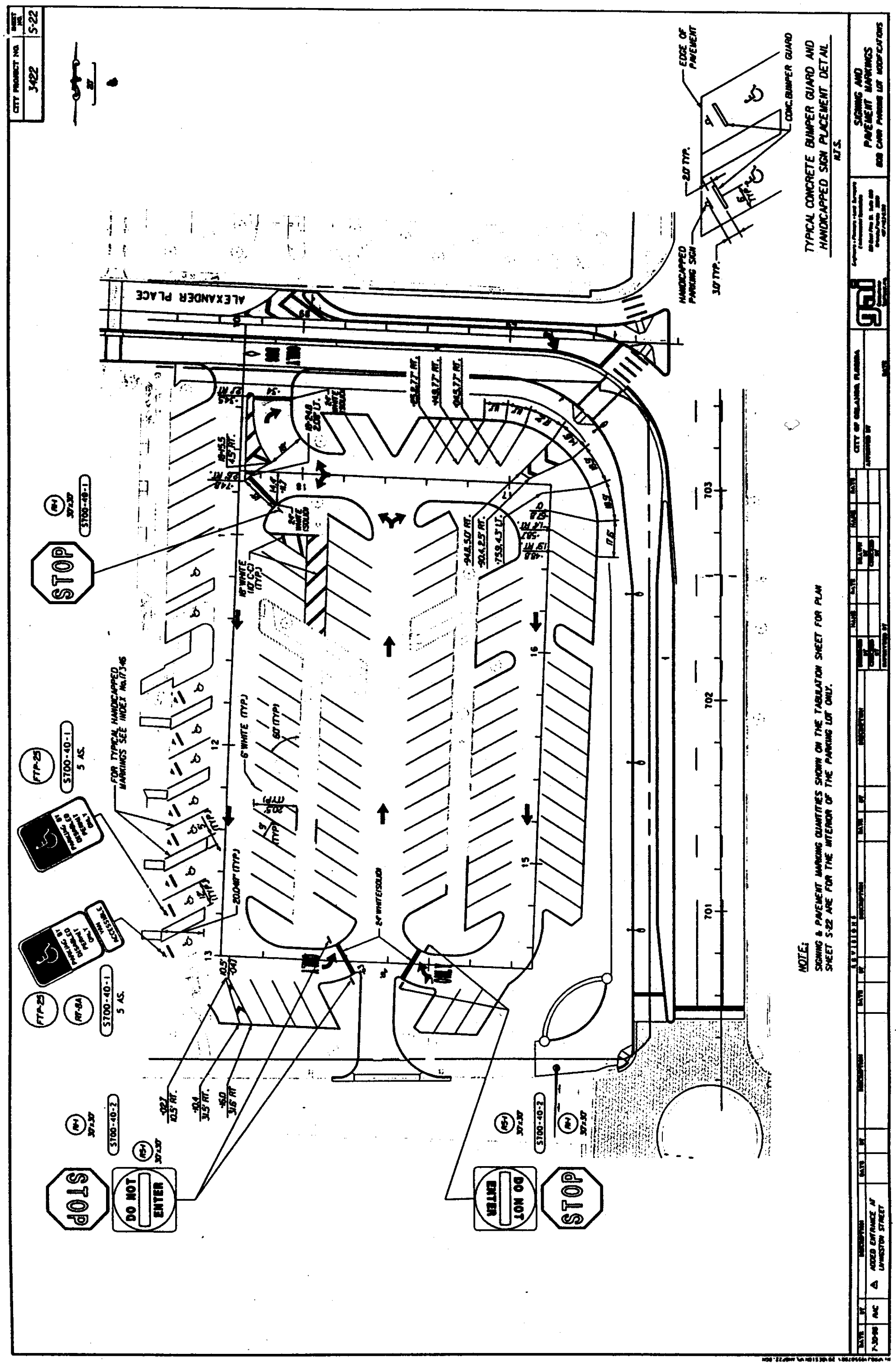

T11-7
GRIND OFF EXISTING STRIPING (TYP.)
FTP-25
18"x12"
5 AS. S700-40-1
9' (TYP.)
12' (TYP.)
9' (TYP.)
FOR TYPICAL HANDICAPPED MARKINGS SEE INDEX No.17346
FTP-25
R7-8A
18"x12"
12"x18"
6 AS. S700-40-1
11'-3"
11'-6"
17'-8"
PROVIDE 4" SOLID YELLOW STRIPE FROM NEW RAMP TO NEW RAMP
ALEXANDER PLACE
SEE SHEET S-5
901
SURVEY @
902
12" WHITE (SOLID) 10' WIDE, 4' O.C.
SEE SHEET S-9
AMELIA STREET
20'
1.5' TYP.
5' STALL (TYP.)
EDGE OF STALL/ SIDEWALK
REMOVE SIGN, FILL HOLE WITH NON SHRINK GROUT & INSTALL NEW SQUARE BREAKAWAY STYLE POSTS IN NEW LOCATION SHOWN. REUSE SIGNS AND RETURN EXISTING POSTS TO THE CITY.
TYPICAL HANDICAPPED SIGN PLACEMENT DETAIL
N.T.S.
CITY PROJECT NO. 3422
SHEET NO. S-18
REVISIONS
DATE 12-4-98 BY TJB
REVISED PARKING STALLS AND LOCATION OF SIGNS.
CITY OF ORLANDO, FLORIDA
APPROVED BY
DATE
gai
SIGNING AND PAVEMENT MARKINGS METER EATER GARAGE

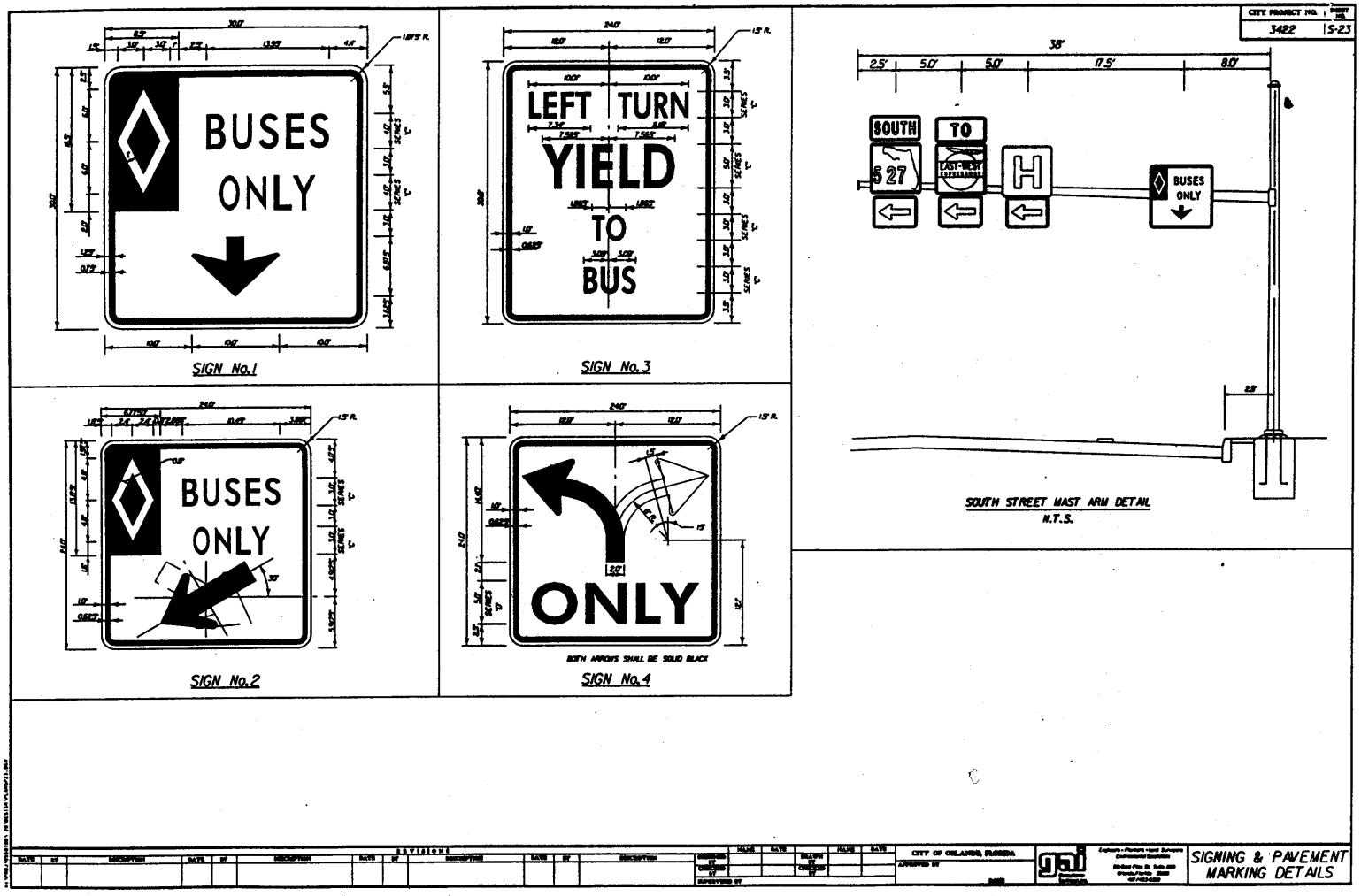


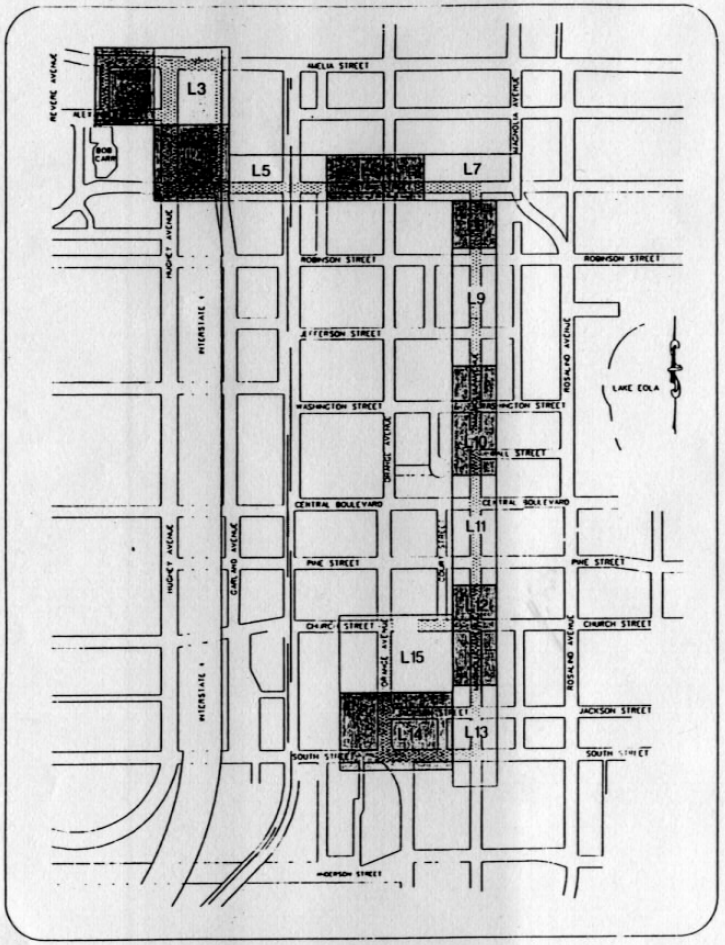
SIGNING AND PAVEMENT MARKINGS AMELIA STREET
AMELIA STREET
STOP
BUSES ONLY
DO NOT BLOCK


SIGNING AND PAVEMENT MARKINGS AMELIA STREET
AMELIA STREET
GARLAND AVENUE
HUGHEY AVENUE
NO TURN ON RED
ONE WAY
BUSES ONLY
DO NOT ENTER
TO WEST
EAST


SIGNING AND PAVEMENT MARKINGS LIVINGSTON STREET
CITY PROJECT NO. 3402
SHEET NO. S-21
CITY OF DELAND, FLORIDA
LIVINGSTON STREET
ROSALIND AVE.
MAGNOLIA AVE.
RIGHT LANE MUST TURN RIGHT
SEE SHEET S-10


ALEXANDER PLACE
STOP
DO NOT ENTER
TYPICAL CONCRETE BUMPER GUARD AND HANDICAPPED SIGN PLACEMENT DETAIL
N.T.S.
NOTE:
SIGNING & PAVEMENT MARKING QUANTITIES SHOWN ON THE TABULATION SHEET FOR PLAN SHEET S-22 ARE FOR THE INTERIOR OF THE PARKING LOT ONLY.
SIGNING AND PAVEMENT MARKINGS
3422
S-22


BUSES
ONLY
SIGN No.1
LEFT TURN
YIELD
TO
BUS
SIGN No.3
BUSES
ONLY
SIGN No.2
ONLY
BOTH ARROWS SHALL BE SOLID BLACK
SIGN No.4
CITY PROJECT NO. 3422
SHEET NO. S-23
38'
2.5'
5.0'
5.0'
17.5'
8.0'
SOUTH
TO
EAST-WEST
EXPRESSWAY
527
BUSES
ONLY
SOUTH STREET MAST ARM DETAIL
N.T.S.
REVISIONS
CITY OF ORLANDO, FLORIDA
SIGNING & PAVEMENT
MARKING DETAILS



PLAN LOCATION KEY
NOT TO SCALE

PLAN LEGEND

- Transit Station Shelter
- Transit Stop
- Bus Exclusive Lane Specialty Paving
- Traffic Separator Buttons and Median
- Traffic Signalization
- Transit Station Specialty Paving with Tactile Warning Strip
- Pedestrian Sidewalk/Specialty Pavers at Courthouse
- Pedestrian Sidewalk/Colored Concrete
- Pedestrian Sidewalk/Grey Concrete
- Intersection "Hex" Pavers
- Pedestrian Crosswalk Painted Asphalt
- Canopy Street Tree
- Existing Canopy Street Tree
- Accent Date Palm Tree
- Canary Island Date Palm
- Shrub Mass
- High Mast Street Lights
- Street Light with Planters
- Street Light with Banners
- Acorn Street Light
- Three Pole Stacked Planters
- Two Pole Stacked Planters
- Single Pole, Two Level Planters
- Single Pole, Spiral Stacked Planters
- Double Banner/Planter Pole
- Single Banner/Planter Pole
- Banner/Stacked Planter Pole
- Railing

REVISION | NO. | DATE

SCALE: 1" = 20'
DRAWN BY: _____ APPROVED: _____
CHK'D BY: _____ DATE: _____

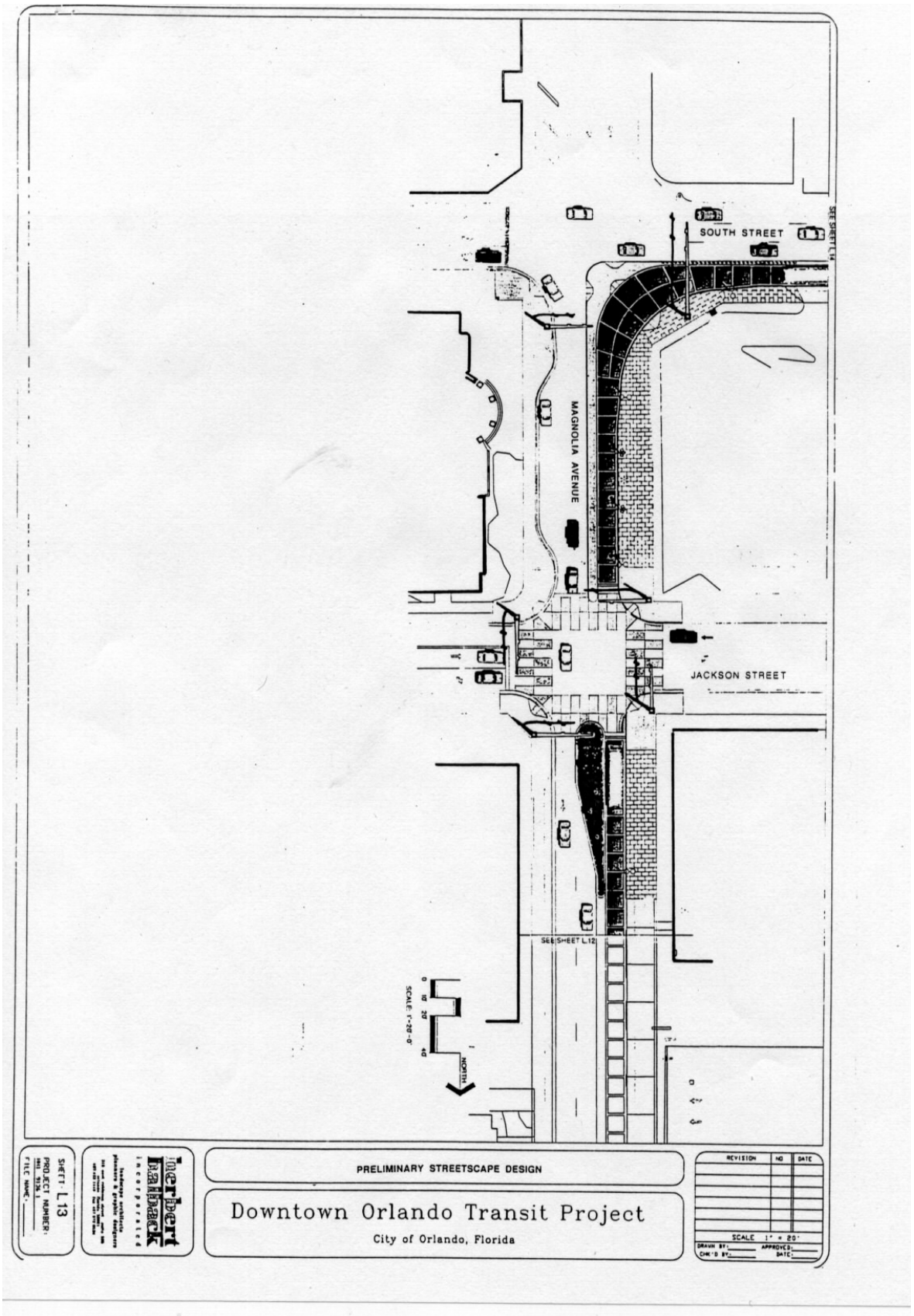
PLAN LOCATION KEY & LEGEND

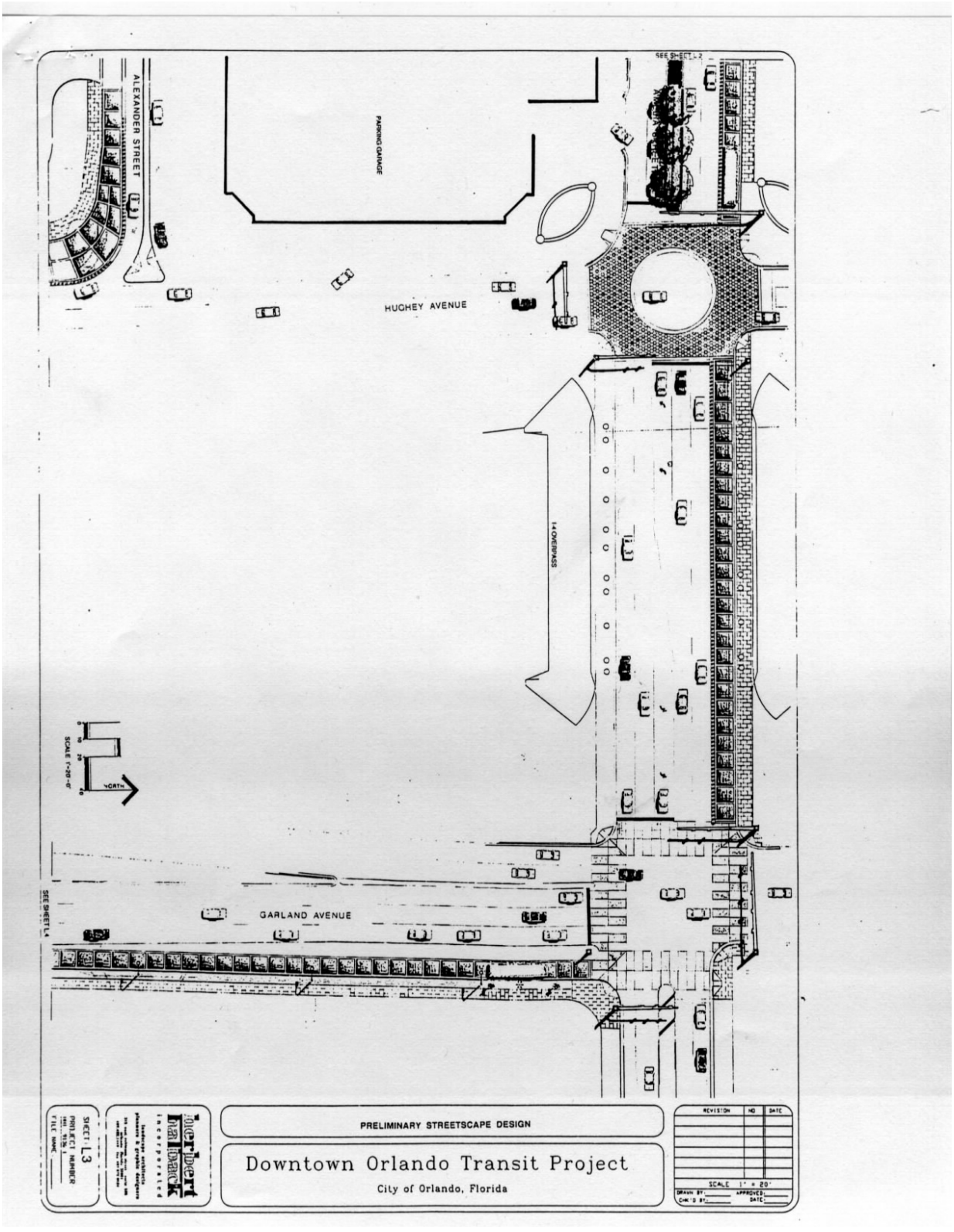
Downtown Orlando Transit Project

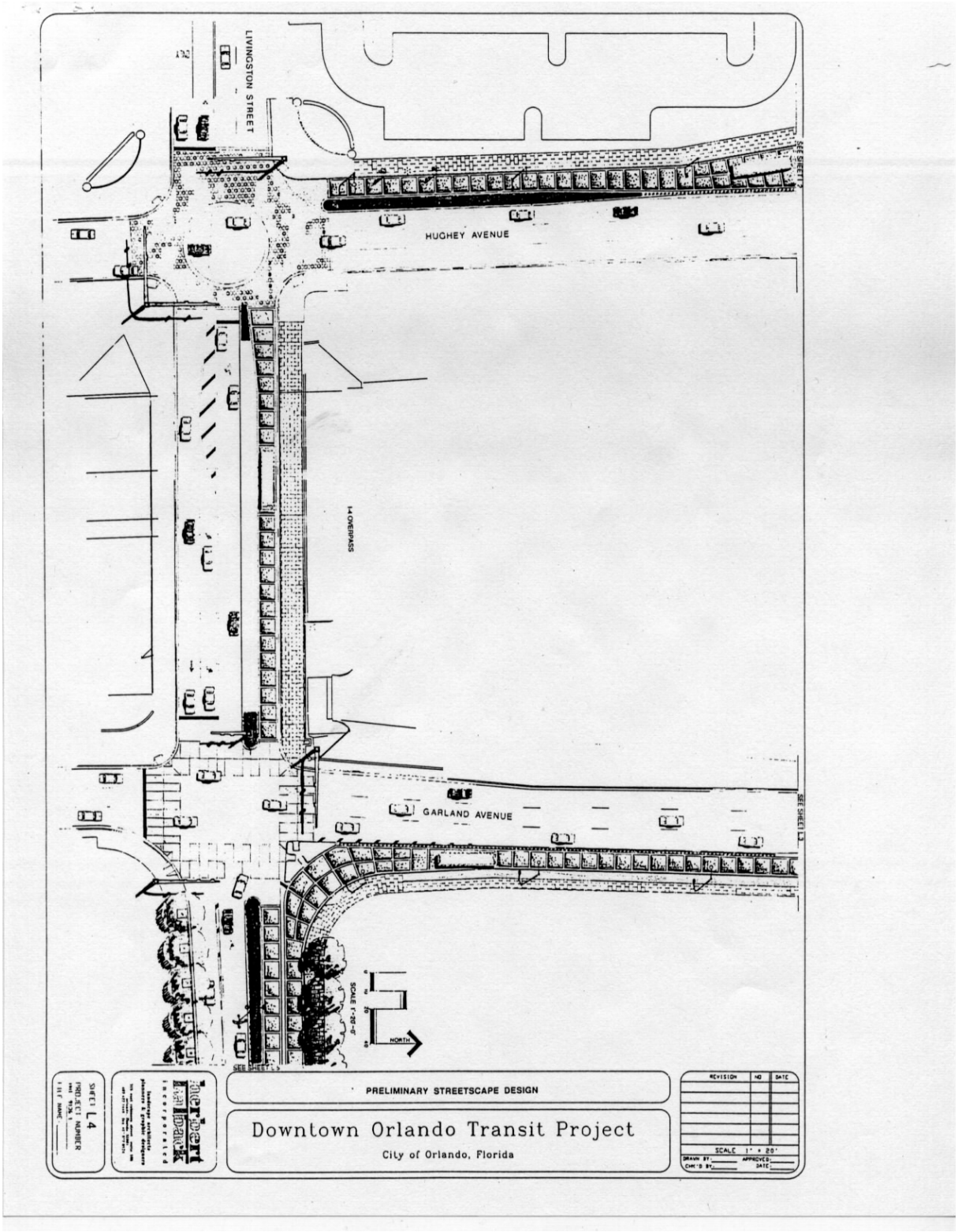
City of Orlando, Florida

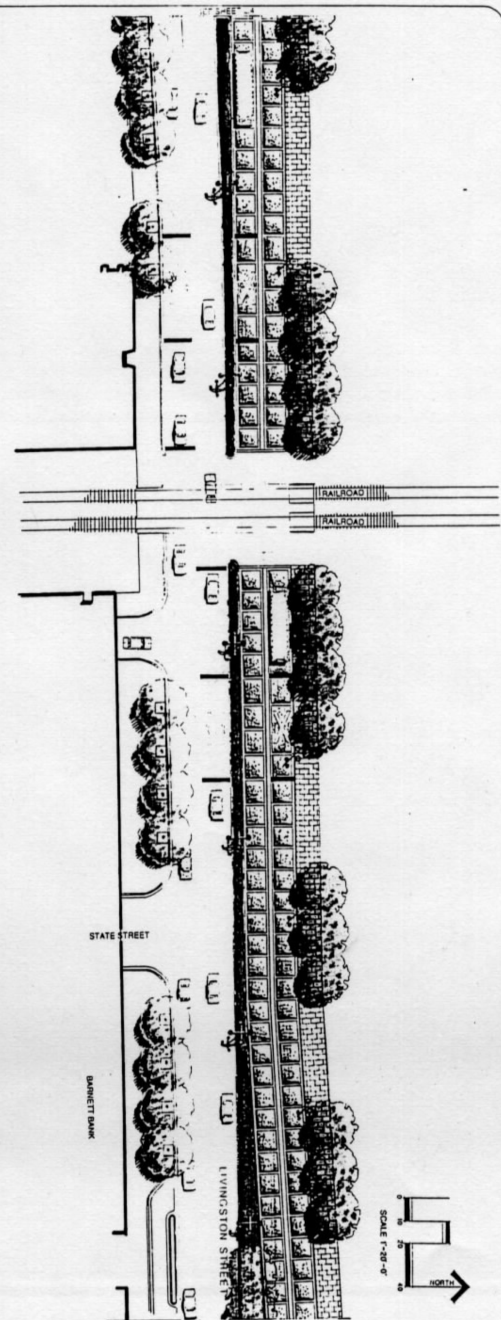
herbert halback
incorporated
landscape architects
planners & graphic designers

SHEET L1
PROJECT NUMBER
FILE NAME


SOUTH STREET
MAGNOLIA AVENUE
JACKSON STREET
SEE SHEET L12
SEE SHEET L14
SCALE 1"=20'-0"
0 10 20 40
NORTH
PRELIMINARY STREETSCAPE DESIGN
Downtown Orlando Transit Project
City of Orlando, Florida
SHEET: L13
PROJECT NUMBER:
FILE NAME:
REVISION
NO
DATE
SCALE 1" = 20'
DRAWN BY:
CHK'D BY:
APPROVED:
DATE:


ALEXANDER STREET
PARKING GARAGE
HUGHEY AVENUE
I-4 OVERPASS
GARLAND AVENUE
NORTH
PRELIMINARY STREETSCAPE DESIGN
Downtown Orlando Transit Project
City of Orlando, Florida
SHEET L3


LIVINGSTON STREET
HUGHEY AVENUE
SEE SHEET 2
I-4 OVERPASS
GARLAND AVENUE
SEE SHEET 3
SCALE 1"=20'
NORTH
SEE SHEET 5
PRELIMINARY STREETSCAPE DESIGN
Downtown Orlando Transit Project
City of Orlando, Florida
SHEET L4
REVISION
NO
DATE
SCALE 1" = 20'
DRAWN BY
CHK'D BY
APPROVED
DATE



PRELIMINARY STREETSCAPE DESIGN

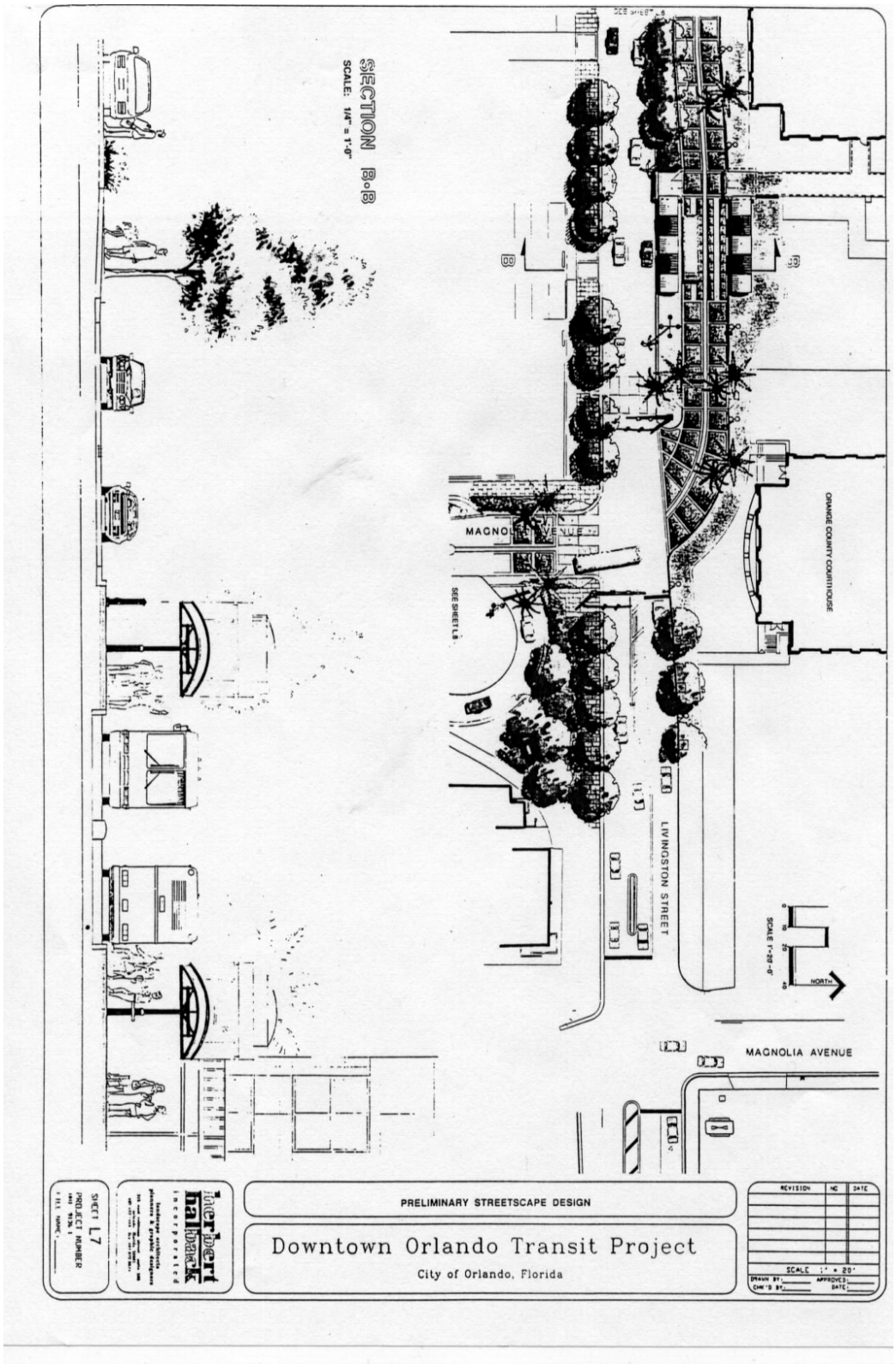
Downtown Orlando Transit Project

City of Orlando, Florida

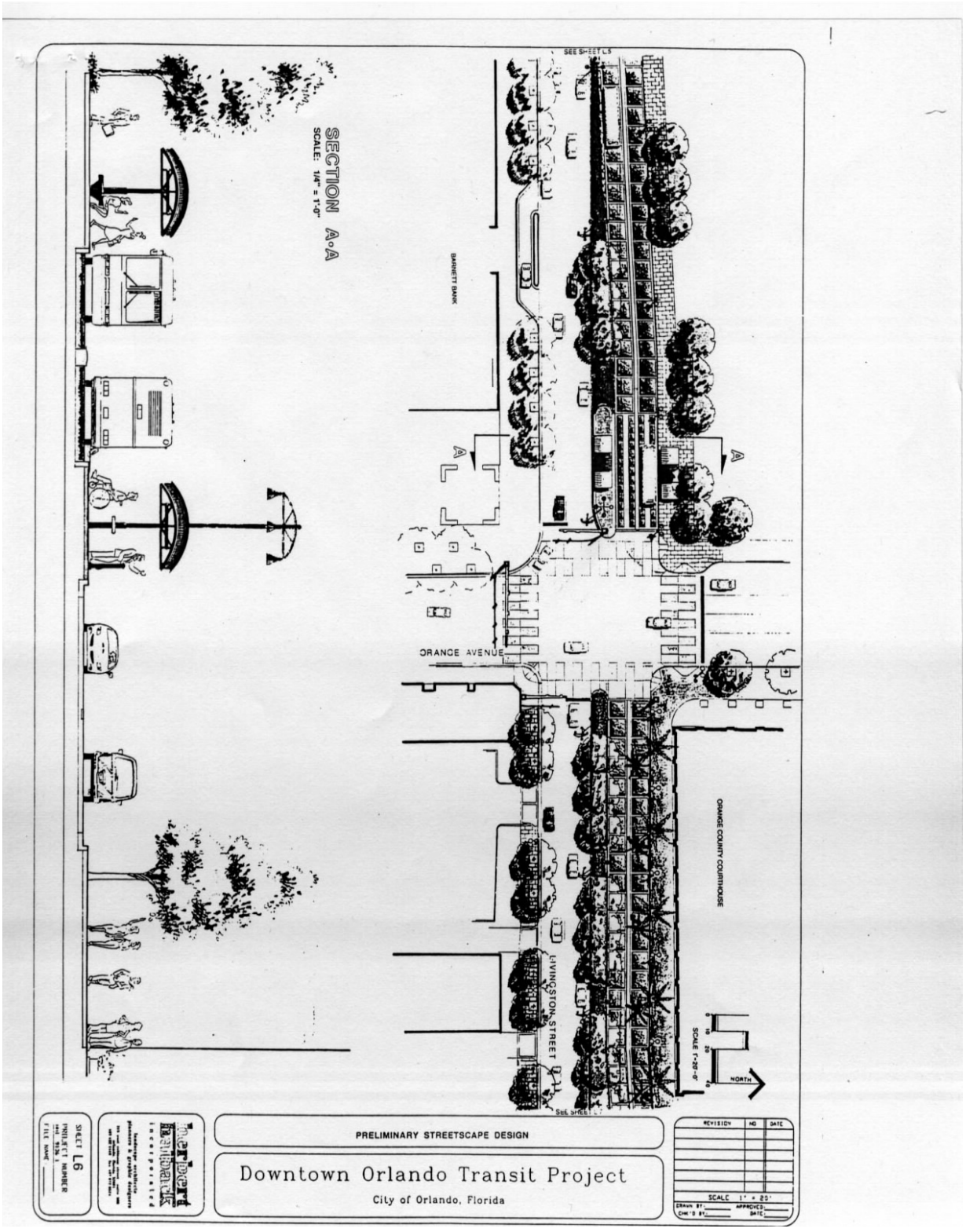
SCALE 1" = 20'

SHEET L5

herbert halback incorporated


SECTION B-B
SCALE: 1/4" = 1'-0"
SEE SHEET L8
MAGNOLIA AVENUE
ORANGE COUNTY COURTHOUSE
LIVINGSTON STREET
SCALE 1"=20'-0"
NORTH
MAGNOLIA AVENUE
PRELIMINARY STREETSCAPE DESIGN
Downtown Orlando Transit Project
City of Orlando, Florida
REVISION
NO
DATE
SCALE 1" = 20'
DRAWN BY:
APPROVED:
CHK'D BY:
DATE:
SHEET L7
PROJECT NUMBER

SECTION C-C
SCALE: 1/4" = 1'-0"
MAGNOLIA AVENUE
PRELIMINARY STREETSCAPE DESIGN
Downtown Orlando Transit Project
City of Orlando, Florida


SECTION A-A
SCALE: 1/4" = 1'-0"
SEE SHEET L5
BARNETT BANK
A
A
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LIVINGSTON STREET
ORANGE COUNTY COURTHOUSE
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NORTH
SEE SHEET L7
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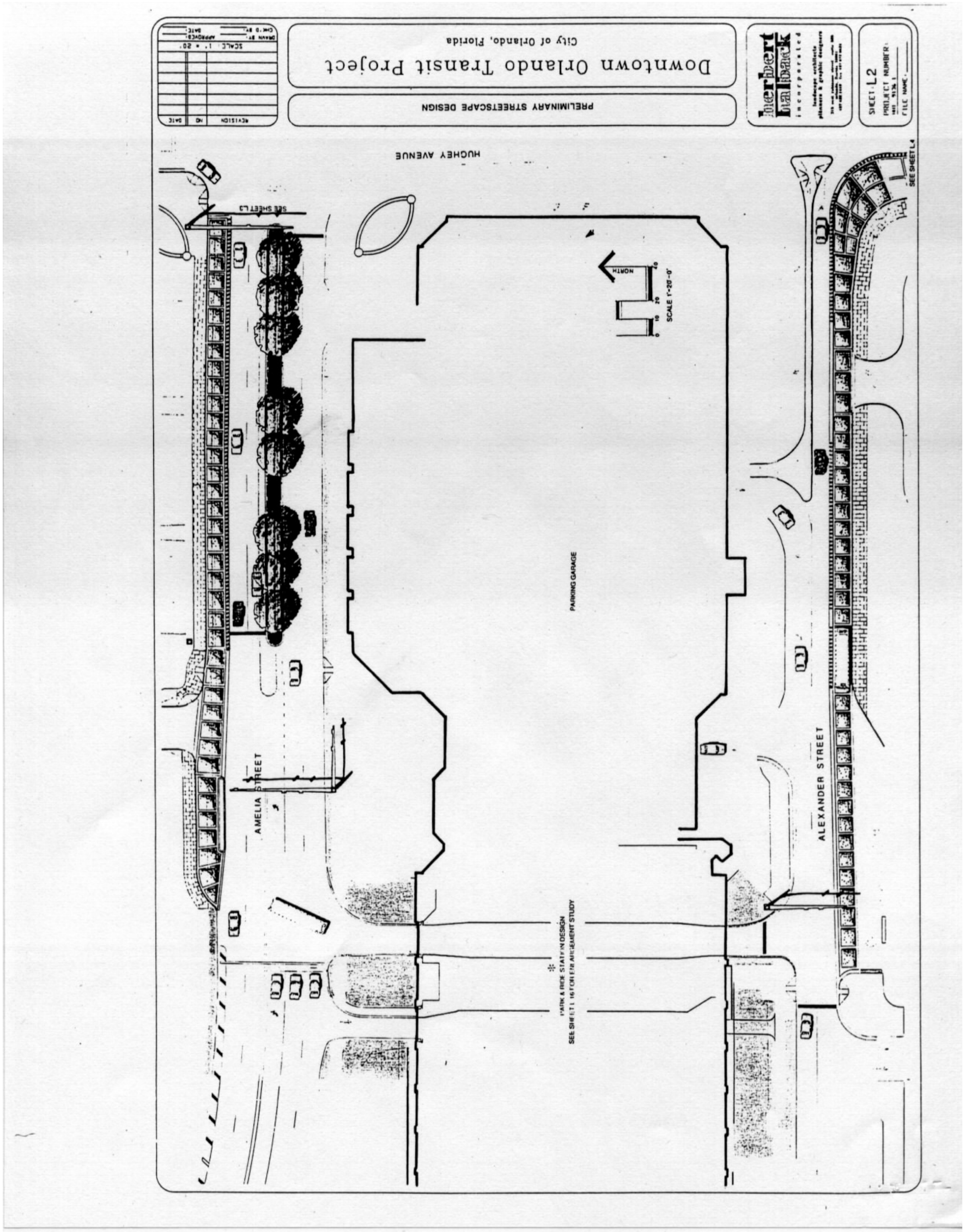
Downtown Orlando Transit Project
City of Orlando, Florida
REVISION
NO
DATE
SCALE 1" = 20'
SHEET L6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City of Orlando, Florida
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REVISION
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AMELIA STREET
ALEXANDER STREET
PARKING GARAGE
NORTH
SCALE 1"=20'-0"
SEE SHEET L3
SEE SHEET L4
PARK & RIDE STATION DESIGN
SEE SHEET L16 FOR ETR ALIGNMENT STUDY

herbert halback incorporated

PRELIMINARY PARK & RIDE STATION DESIGN

Downtown Orlando Transit Project

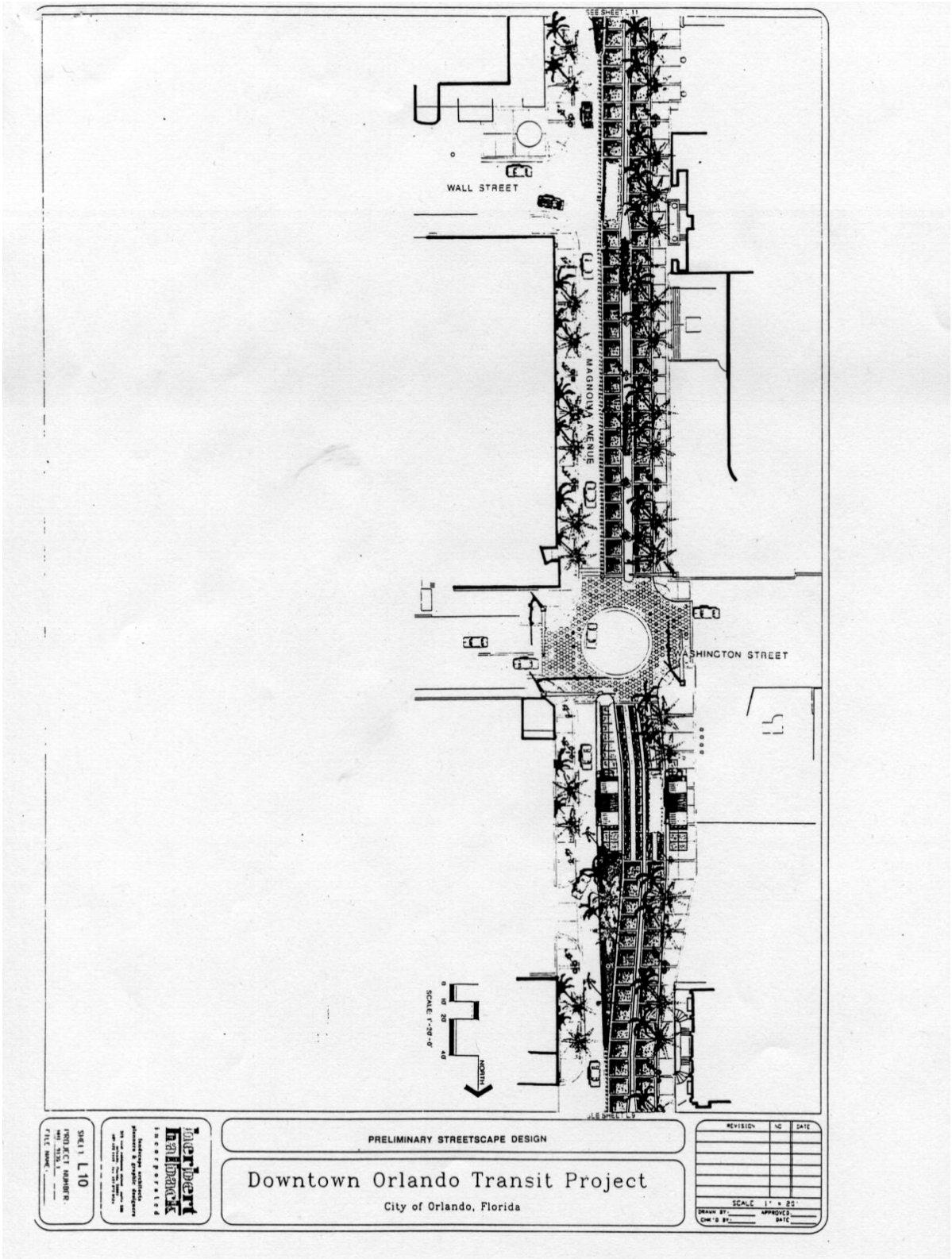
City of Orlando, Florida

REVISION	NO.	DATE

SCALE: AS SHOWN
DRAWN BY: BRYAN APPROVED
CHK'D BY: DATE

SHEET L.16

TRAFFIC SIGNALIZATION
CROSSWALK
INTERSECTION
TACTILE WARNING STRIP
PEDESTRIAN RAILING
VERTICAL PLANTERS
TRELLIS FRAMING
METAL ROOF
LEANING RAIL
STATION LOCATION
SEAT
MAGNOLIA & JEFFERSON
THREE BAY STATION
SHELTER
ACCENT PAVING WITH IMPRINT ARTWORK
CART WAY PAVEMENT LIGHTS
PEDESTRIAN SIDEWALK
BUS CART WAY
SPECIMEN PALMS
HIGH MAST LIGHTING WITH BARRIERS
PLANTING
AUTOMOBILE LANE
FOUR BAY STATION
FIVE BAY STATION
ISOMETRIC VIEW
SCALE: 1" = 5'-0"
herbert halback
incorporated
PRELIMINARY PROTOTYPICAL STATION DESIGN
Downtown Orlando Transit Project
City of Orlando, Florida
L-17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WALL STREET
MAGNOLIA AVENUE
WASHINGTON STREET
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NORTH
SEE SHEET L9
PRELIMINARY STREETSCAPE DESIGN
Downtown Orlando Transit Project
City of Orlando, Florida
herbert landmark
incorporated
SHEET L10
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DATE
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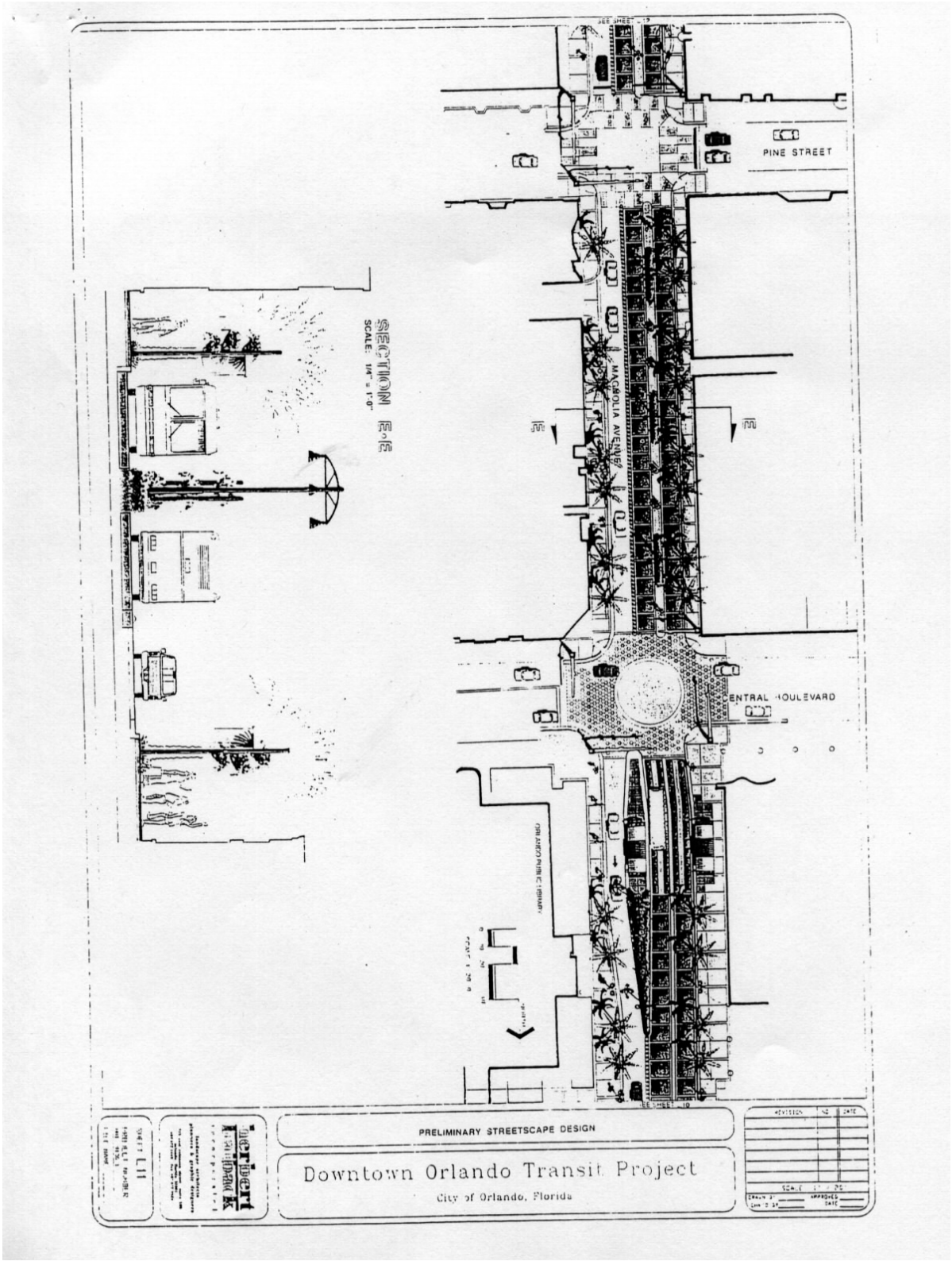
DRAWN BY:
CHK'D BY:
APPROVED
DATE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MAGNOLIA AVENUE
CENTRAL BOULEVARD
ORANGE AVENUE
SECTION E-E
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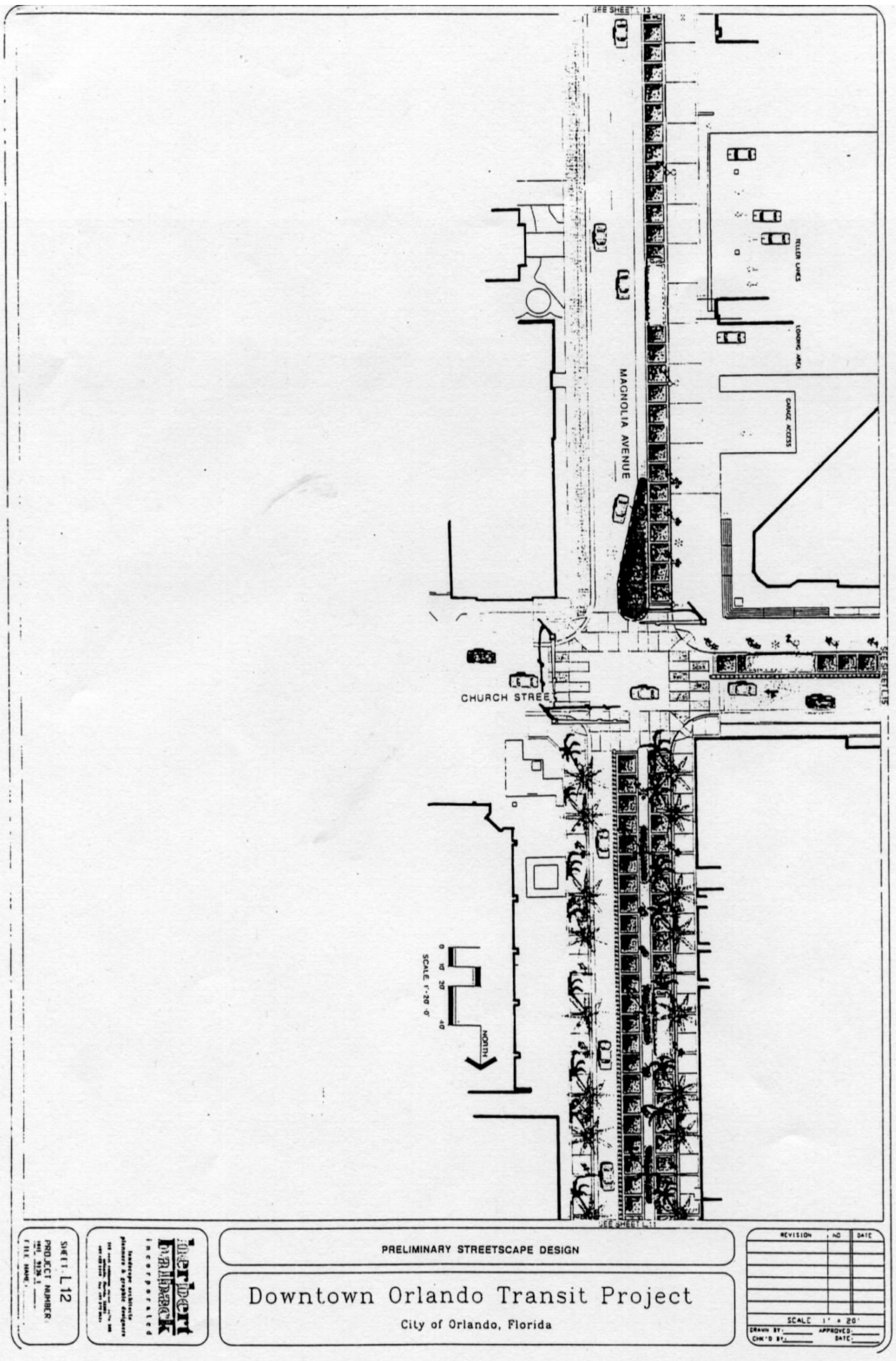
Downtown Orlando Transit Project
City of Orlando, Florida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Downtown Orlando Transit Project
City of Orlando, Florida
SHEET L12
PROJECT NUMBER
FILE NAME
REVISION
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APPROVED
CHK'D BY
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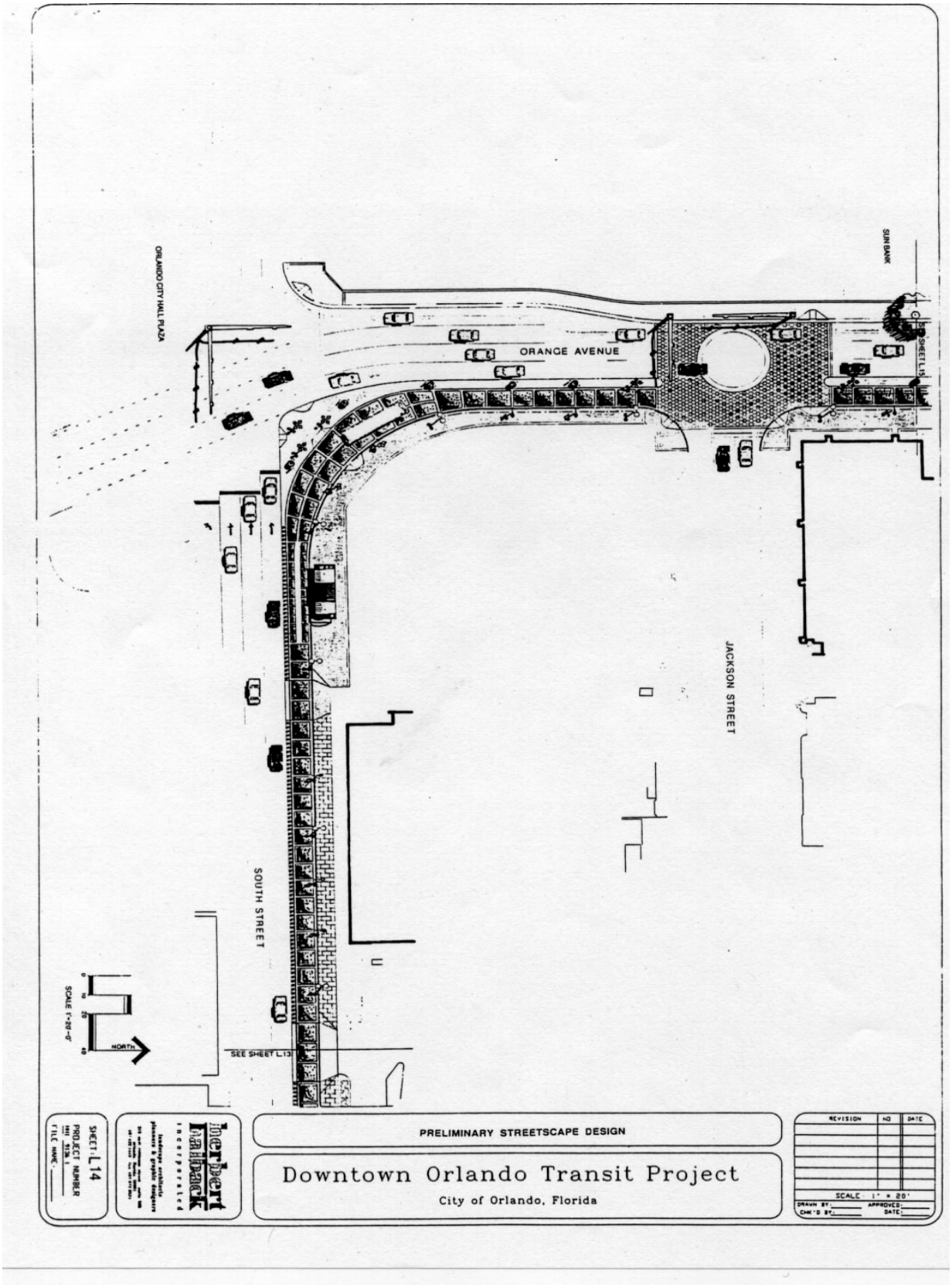
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ORANGE AVENUE
SUN BANK
SEE SHEET L13
JACKSON STREET
SOUTH STREET
SEE SHEET L13
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SCALE 1"=20'-0"
SHEET: L14
PROJECT NUMBER
FILE NAME:
Herbert Hallbeck
incorporated
PRELIMINARY STREETSCAPE DESIGN
Downtown Orlando Transit Project
City of Orlando, Florida
REVISION
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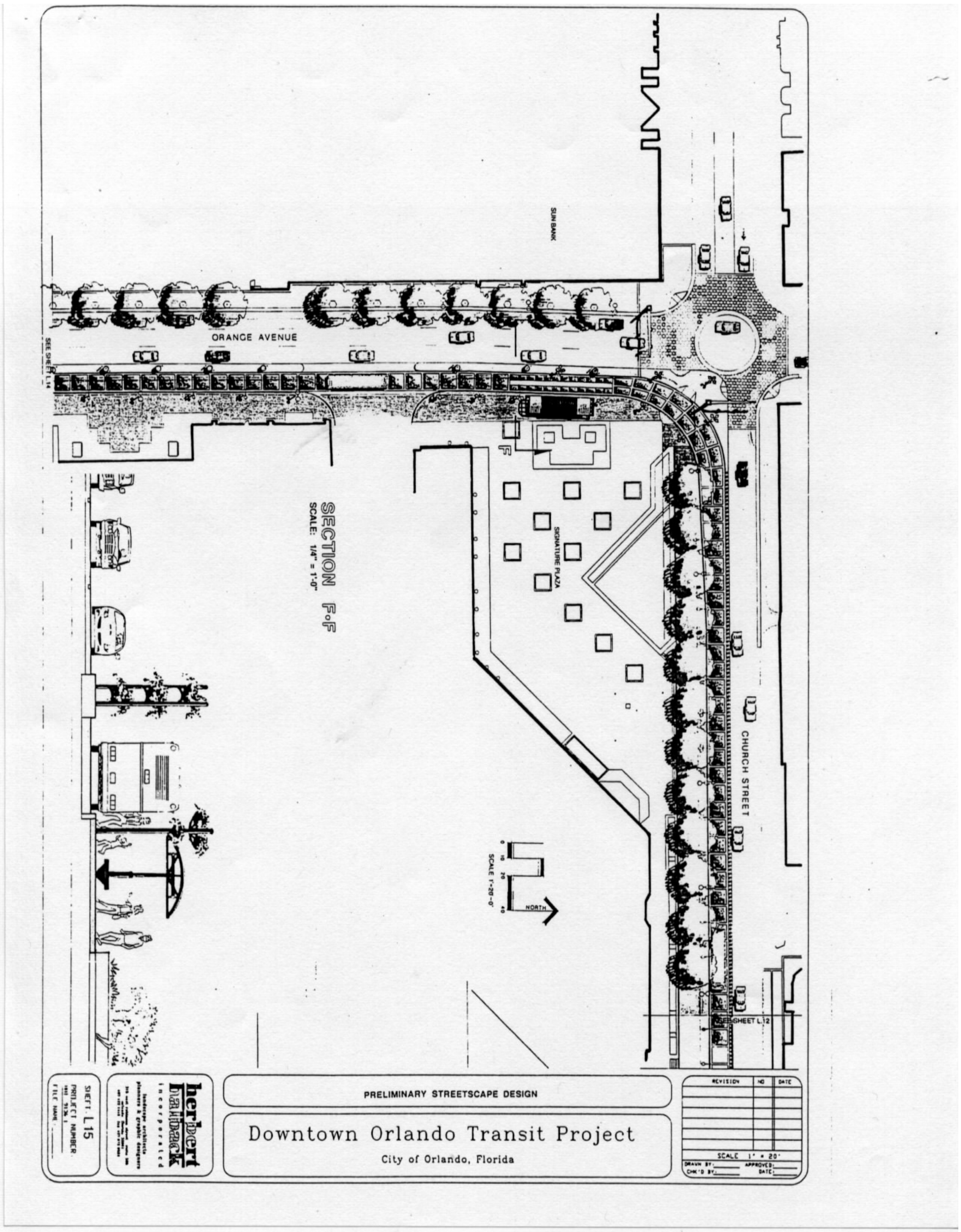
DRAWN BY
CHK'D BY
APPROVED
DATE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CHURCH STREET
SIGNATURE PLAZA
SUNBANK
SECTION F-F
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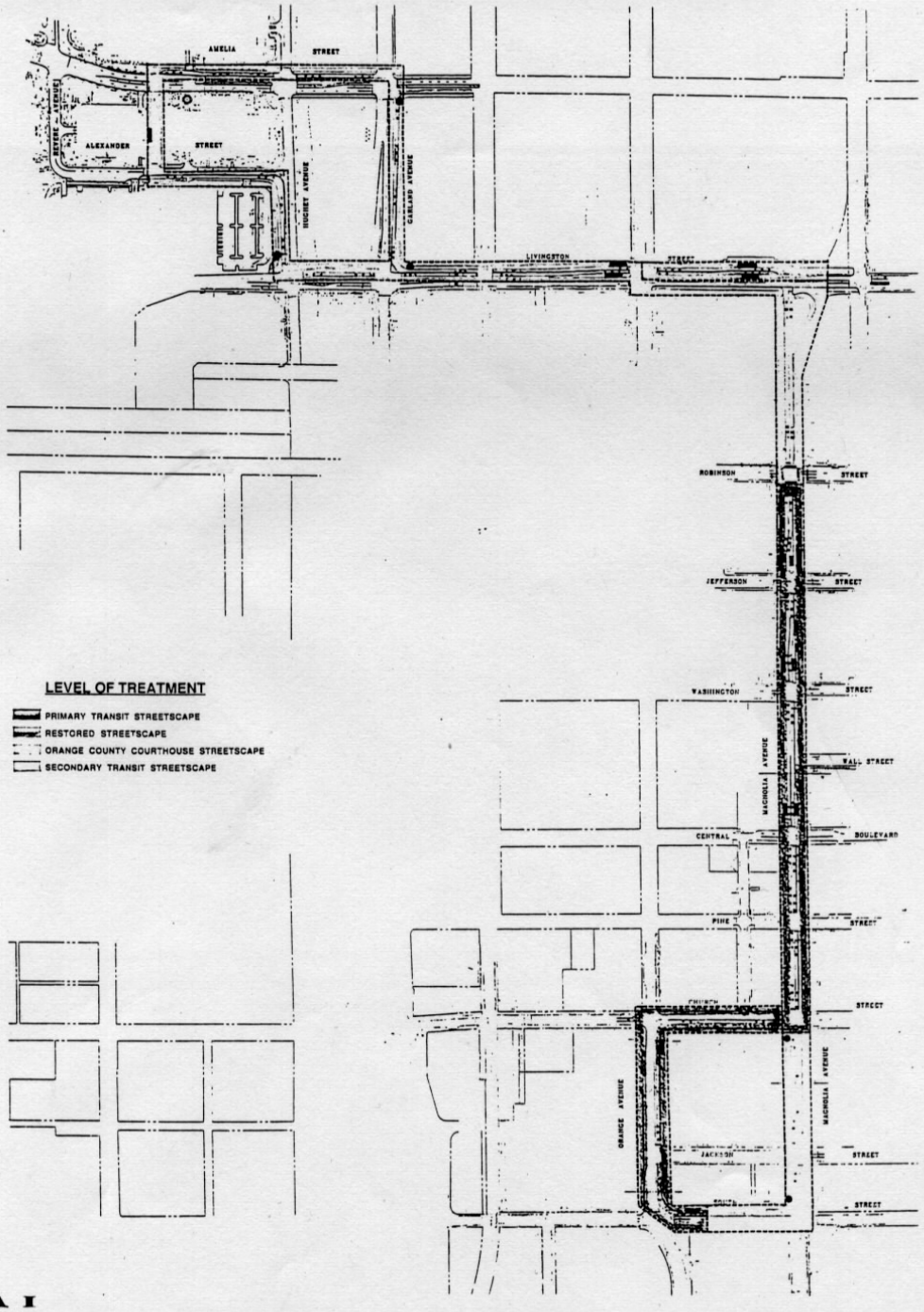
Downtown Orlando Transit Project
City of Orlando, Florida
SCALE 1" = 20'
SHEET L15

URBAN DESIGN TREATMENTS FOR CORRIDOR



GAI
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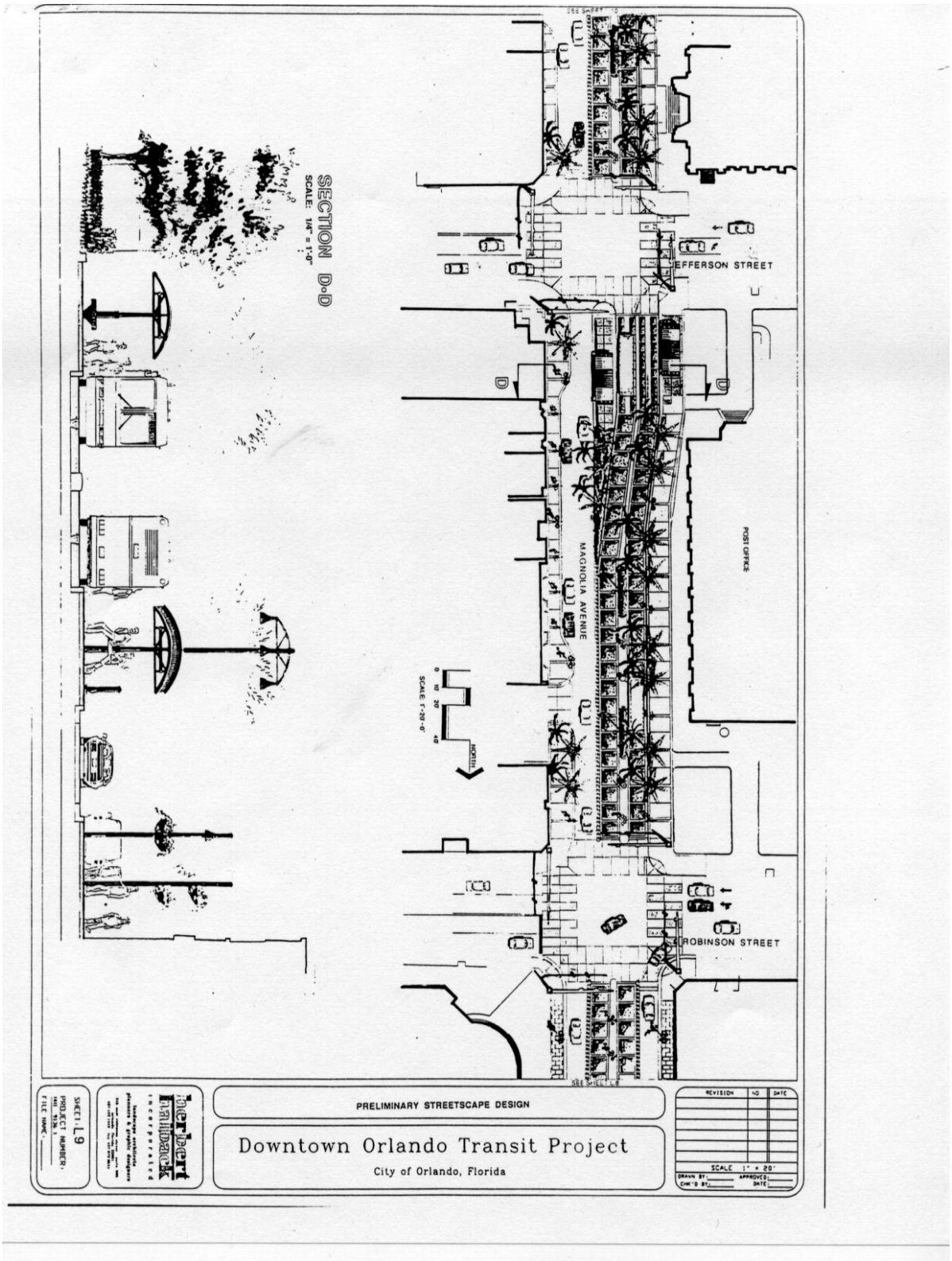
DOWNTOWN ORLANDO
TRANSIT PROJECT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MAGNOLIA AVENUE
POST OFFICE
ROBINSON STREET
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PRELIMINARY STREETSCAPE DESIGN
Downtown Orlando Transit Project
City of Orlando, Florida
SHEET: L9
REVISION
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DATE
SCALE 1" = 20'

Lynx LYMMO
Bus Rapid Transit Evaluation

Technical Memorandum Two: Project Assessment and Evaluation and Customer Satisfaction

Contract BC-137-17

Final Report

Prepared for the

Federal Transit Administration and Florida Department of Transportation

By the

National Bus Rapid Transit Institute

Table of Contents

List of Exhibits

Introduction

One of the main goals of the Federal Transit Administration's (FTA) Bus Rapid Transit (BRT) Demonstration Program is to determine the effects of BRT demonstration projects through a detailed evaluation process. While not one of FTA's ten designated BRT demonstration projects, the Lynx LYMMO was chosen by the FTA for evaluation due to its Intelligent Transportation Systems (ITS) and as a model for the implementation of similar BRT systems. According to the FTA, it believes that only by carefully documenting and analyzing the effects of the BRT projects and unique features of each that it will be possible to determine which features are most effective in certain contexts such as the type of service offered, the level of transit demand, the size of the region, passenger amenities used, ITS, and other characteristics to ultimately increase the usage of public transport. The FTA believes that various BRT projects will serve as learning tools and models for other locales throughout the country, and possibly the world. In order for these BRT projects to have maximum effectiveness in their respective operational capacities, the FTA believes that a consistent and carefully structured approach to project evaluation is necessary.

In addition, the FTA wants to examine specific impacts of various BRT projects. These impacts include the degree to which bus speeds and schedule adherence improve; the degree to which ridership increases due to improved bus speeds (the linchpin of BRT operation), schedule adherence, and convenience; the effect on other traffic; the effect of each of the components of BRT on bus speed and other traffic; the benefits of ITS/APTS applications to the BRT project; and the effect of BRT on land use and development. In order to meet these objectives, the FTA understands that it will be necessary to collect a variety of different types of data on several aspects of BRT projects, including measurable impacts to BRT customers via a comprehensive surveying process.

The purpose of this evaluation is to document and evaluate the LYMMO service as one of the newest applications of BRT service in the U.S. The National Bus Rapid Transit Institute (NBRTI) in partnership with Lynx, FDOT, and FTA is conducting an objective evaluation of the LYMMO and realization of community goals since inception of the LYMMO in August 1997.

Technical Memorandum Two: Objective

Technical Memorandum Two (2) provides an objective evaluation of the performance of the LYMMO since its inception. The intent of Technical Memorandum Two is to identify current performance strengths and weaknesses, customer satisfaction, effectiveness of technology in

meeting original project goals, and the benefits of the LYMMO to the Downtown and Central Florida community. A subtask within this tech memo was to determine the levels of satisfaction among customers of the LYMMO. Technical Memorandum Two builds upon the information gathered as part of Technical Memorandum One - Technical Documentation.

Technical Memorandum Two contains the following sections:

- o On-board Survey of LYMMO Customers;
- o Results from Two Focus Groups;
- o Interviews with Downtown Business, Government Agencies, and System Partners; and
- o Review of LYMMO Customer Concerns and Commendations.

On-Board Survey of LYMMO Customers

In keeping with the FTA's evaluation guidelines, the Center for Urban Transportation Research (CUTR), working jointly with Lynx, conducted an on-board survey of LYMMO customers in December 2001. Examination of the various components of the LYMMO is a critical part of the evaluation of the LYMMO demonstration project. The on-board survey was conducted to assess customer perceptions, behavior, and profiles and to determine the many reasons that persons elect to use the LYMMO BRT service such as faster travel time, ease of use, and vehicle and station features. The on-board survey asked customers to evaluate various elements of service as well as overall satisfaction, with the ultimate purpose of measuring the impacts of the LYMMO on customer perceptions. Specific questions focused on customer behavior, including trip origins and destinations, frequency of LYMMO use, and why customers elected to use the LYMMO BRT service. Questions also obtained information about the riding experiences of customer with the LYMMO. Due to the short time that customers are actually on board LYMMO vehicles while making trips (usually just one or two stops taking no longer than 1-2 minutes to complete the trip), standard demographic questions such as those inquiring about age, income, and ethnicity were omitted from the survey instrument. The intent behind omitting these and other standard on-board survey questions was to shorten the survey as much as possible with the hope of increasing the overall response rate and obtaining completed surveys.

About the LYMMO BRT System

The LYMMO BRT system operates on a continuous loop through Downtown Orlando using a combination of the various types of dedicated BRT travel ways including median and same-side travel way configurations. In some instances, the travel ways are colored gray to denote to

vehicular traffic that the lanes are only for the LYMMO vehicles. The LYMMO uses 10 low-floor vehicles fueled by environmentally-friendly compressed natural gas. The vehicles use high-quality interiors that incorporate an ITS system know as Transit TV Network (formerly ITEC). The TTVN provides real-time information such as Downtown events, weather, and fun and trivia to customers. In addition, public-art exteriors are used on the vehicles to enhance the customer's experience with the LYMMO. The LYMMO system has 11 lighted and computerized stations and 8 additional stops.

The LYMMO vehicles operate approximately every five minutes during office hours, and after office hours, vehicles operate approximately every 10 minutes. Since the inception of service, the LYMMO has been free to ride during all hours of operation. The LYMMO operates from 6 AM to 10 PM, Monday through Thursday, 6 AM to Midnight on Friday, 10 AM to Midnight on Saturday, and 10 AM to 10 PM on Sunday.

Survey Methodology & Procedures

The survey instrument was printed in English only and contained a total of 13 questions. Customers were not provided with additional space on the survey for open-ended written comments. CUTR and Lynx staff jointly developed the survey instrument. The on-board surveying of customers was conducted on Thursday, December 20, 2001, deemed a typical day of LYMMO operation.

This on-board survey specifically targeted those customers using the LYMMO for all or a portion of their trips in Downtown Orlando. Surveying began at the start of service and concluded at about 7 PM. Given that the typical weekday LYMMO schedule consists of about 186 round trips (circulations) and the last trip begins at 10 PM, this translates into just over 90 percent of all weekday trip being included in the sample.

Surveyors were instructed to offer a survey form to each customer upon boarding a bus. If a customer had completed a survey previously, they were asked to complete a shorter 4-question survey that inquired about the frequency of LYMMO trips during the day of surveying, trip purpose, and start and end points of the trip in question. Every time a customer boarded a LYMMO vehicle to make a subsequent trip (regardless of the whether the trip was their second, third, fourth, and so on), they were asked to complete the smaller survey. Surveyors were instructed to do the best they could to encourage participation in the survey.

The data collected from the surveys were entered into an Access database and prepped for analysis. CUTR staff performed the entry, review, and analysis of the data. The software SPSS (Statistical Product and Service Solutions) was used to analyze the data. It should be noted that CUTR did reclassify survey responses to comply with the survey format in those few cases in which the respondent did not fully consider the available response choices.

Prior to analysis, the survey responses were weighted based on the total ridership for the day of the survey (December 20, 2001 – 3,909 customers). Specifically, the weighting factor was calculated by dividing the total ridership (obtained from Lynx staff) for the LYMMO during that day of service. The resulting weight factor of 4.208 was applied to each completed survey's data for statistical analysis. The reader should keep in mind that the survey methodology involved the survey of willing customers, as often as possible. This methodology corresponds most closely with ridership data that are reported as "unlinked trips." Exhibit 1 indicates the LYMMO ridership for the month of December 2001 that were provided by Lynx staff and subsequently used for the weighting. The data in Exhibit 1 below are representative of the five-day (Monday through Friday) total weekly ridership for the LYMMO.

Exhibit 1: Total Monthly LYMMO Ridership — December 2001

Week (Saturday through Friday)	Ridership	Percent of Total Ridership
Dec 1 – Dec 7	20,618	27.84%
Dec 8 – Dec 14	20,592	27.81%
Dec 15 – Dec 21	19,992	27.00%
Dec 22 – Dec 28	10,304	13.92%
Dec 29 – Dec 31	2,541	3.43%
Total Ridership	74,047	100%

Response Rate

Survey forms were coded with a unique identification number and assigned for distribution throughout the day of surveying. Exhibit 2 indicates the proportion of completed surveys for the day of surveying to the 929 total completed valid LYMMO surveys. The response rate for the on-board survey of LYMMO customers was 23.7 percent - a favorable rate for this type of survey where the industry norm is in the 10 to 20 percent range. The number of returned surveys of 929 yields an accuracy of within ±3.0 percent at the 95 percent confidence level (O'Sullivan, Elizabethan, and Gary R. Rassel, Research Methods for Public Administration, 1989, Longman, New York, p. 131). This means that with the same sampling procedures, 95 times out of 100 the results will be within ±3.0 percent of the true value, that is, those values that would be obtained if a 100 percent census of all customers on all trips were conducted.

Exhibit 2: Response Rate for LYMMO On-Board Survey

Route	Total Survey Responses	Customers on LYMMO During Day of Surveying	Response Rate
LYMMO BRT	929	3,909	23.7%

Organization of Survey Analysis

The analysis of the results from the on-board survey is presented in the following sections: Survey Completion, Trip Characteristics, Travel Behavior, and Customer Satisfaction. Each section provides information about the survey results that will be useful when evaluating and prioritizing enhancements to the LYMMO service.

The Survey Completion section presents the question-by-question response rates for the entire survey. A brief analysis provides an evaluation of the survey form itself to determine, for example, whether it was easy for respondents to understand and complete. The Trip Characteristics section details specific attributes of the customers' individual trips such as origins and destinations within Downtown Orlando. The Travel Behavior section examines the customers' overall transit usage characteristics including how frequently they ride the LYMMO, whether customers use other Lynx services, and if customers use the special features provided by the LYMMO service such as electronic information at stations and the on-board video displays. Additionally, the customers' reasons for using the LYMMO and what fare would customers most likely pay to ride the LYMMO if it were not currently free to ride.

The final section reviews customer satisfaction with specific aspects of LYMMO service as determined by the responses to two questions on the survey. Specifically, this section analyzes the responses to Question 7 which asked customers to rank their three favorite LYMMO features from a list of 12 features and Question 13 asked customer to rate their satisfaction with the LYMMO's travel time, safety, reliability, comfort, and the overall quality of the service. Strengths and weaknesses of the system as perceived by customers are identified from a list of five discrete responses. Customers were asked to rate their satisfaction level with the LYMMO service from "very satisfied" to "very dissatisfied."

Survey Completion

The instrument that was utilized for the LYMMO on-board survey contained a total of 13 questions, some with multiple components. The majority of questions were closed-ended in nature, simply requiring customers to select from a list of responses provided. Since answering

every question on the survey was not a requirement for the survey to be included in this analysis, many of the records in the final survey database had missing values for various questions. To help the reader better understand the respondent sample sizes for each of the questions analyzed, Exhibit 3 has been provided below. The response rates for all questions have been calculated based on a total of 929 completed valid and unweighted surveys.

Exhibit 3: Response Rate by Survey Question

Survey Question	Valid Responses	Response Rate
Q1	192	20.7%
Q2	895	96.3%
Q3	782	84.2%
Q4	908	97.7%
Q5	898	96.7%
Q6	743	80.0%
7A	189	20.3%
7B	130	14.0%
7C	95	10.2%
7D	281	30.2%
7E	70	7.5%
7F	85	9.1%
7G	72	7.8%
7H	249	26.8%
7I	369	39.7%
7J	506	54.5%
7K	204	22.0%
7L	7	< 1%
Q8	830	89.3%
Q9	877	94.4%
10A	585	63.0%
10B	96	10.3%
10C	205	22.1%
10D	312	33.6%
10E	355	38.2%
10F	71	7.6%
10G	57	6.1%
10H	128	13.8%
10I	89	9.6%
10J	38	4.1%
10K	127	13.7%
10L	100	10.8%
10M	55	5.9%
Q11	814	87.6%
Q12	845	91.0%
Q13A	824	88.7%

Survey Question	Valid Responses	Response Rate
Q13B	798	85.9%
Q13C	794	85.5%
Q13D	798	85.9%
Q13E	794	85.5%

Based on the individual question response rates shown in Exhibit 3 and a review of a random sample of completed surveys, it appears that an overwhelming majority of customers understood and responded properly to each of the survey questions. The lowest response rates were exhibited by the questions in which respondents were asked to select multiple responses from lists of possible responses (Question 7 and Question 10). Due to the short nature of the survey instrument, there were no questions that inquiring about personal information from customers such as age, gender, ethnicity, and annual household income.

Trip Characteristics

The purpose of Questions 1, 2, and 3 was to allow customers to describe the nature of their trip in terms of place of origin, purpose, and final destination. From Exhibit 4 that highlights the frequency distributions for Question 2, it is clear that most LYMMO customers use the system to get to their jobs and for lunch, shopping, and errands while in the downtown area. Interestingly, just fewer than 9 percent of customers use the LYMMO for Jury Duty while in Downtown Orlando (persons reporting to Jury Duty and parking an automobile are required to use the LYMMO by the court system). Those respondents that indicated "Other" noted that the purpose of their trips was to go to school and to court to take care of some type of legal matter.

Exhibit 4: Q2 – What is the Purpose of THIS TRIP?

Category	%
Work	51.5%
Lunch/Shop/Errands	17.4%
Jury Duty	8.7%
Event at Bob Carr	0.2%
Event at Arena	1.6%
Other	20.6%
Total	100%

Question 1 asked respondents to indicate where they came from before getting on the LYMMO and Question 3 asked respondents to indicate where they are going after getting off the LYMMO during the same unlinked trip. The results for both questions show that the primary origins and destinations of LYMMO customers are the Centroplex Parking Garage, Courthouse, Church Street, Library, Lake Eola Park, Bob Carr Auditorium, SunTrust Bank, and Bank of America, as shown in Exhibit 5.

Exhibit 5: Q1 and Q3 – Where are you going to and coming from before and after boarding the LYMMO bus for THIS TRIP?

Frequent Downtown Origin and Destinations
Centroplex Parking Garage
Courthouse
Church Street
Library
Lake Eola Park
Bob Carr Auditorium
SunTrust Bank
Bank of America

Fare and Travel Behavior

A series of questions were included on the survey instrument to determine the LYMMO customers' fare payment and travel behavior characteristics. These questions included:

- Frequency of use (Question 4)
- Highest Amount Willing to Pay to Ride LYMMO (Question 12)
- Use of Other Lynx Services (Question 6)

Frequency Of Use

Question 4 asked customers how often they use the LYMMO. As shown in Exhibit 6, 40.5 percent of customers use the LYMMO 2 or 3 times per day. This result is consistent with the information obtained from the survey that asked about trip making history during the on-board survey in which customers indicated making an average of 2.45 trips per day on the LYMMO.

Exhibit 6: Q4 – How often do you use *LYMMO*?

Category	%
4 or more times/day	13.1%
2 or 3 times/day	40.5%
Once/day	9.6%
Few times/week	15.0%
Few times/month	7.7%
Few times/year	6.5%
First time rider	7.6%
Total	100%

Highest Amount Willing to Pay to Ride LYMMO

Question 12 asked customers to indicate what fare amount would be the most that they would be willing to pay to ride the LYMMO if it were not currently free to ride. Exhibit 7 provides the results for Question 12. As shown in the exhibit, despite rating LYMMO service favorable (see results for Question 13), 41.8 percent of customers indicated that they would like the LYMMO to remain free of charge to ride. This finding is significant in that it indicates that current customers may not be willing to ride the LYMMO if is not free of charge, despite offering reliable and frequent service. The second most frequent amount that customers are willing to pay to use the LYMMO is $0.25; 25.8 percent of customers indicated this fare amount.

Exhibit 7: Q12 – What amount would be the most that you would pay to ride *LYMMO*?

Category	%
$1	12.5%
$0.75	4.3%
$0.50	15.6%
$0.25	25.8%
Nothing	41.8%
Total	100%

Use of Other Lynx Services

Question 5 asked customers the following question: "Do you use other Lynx services besides *LYMMO*?" Exhibit 8 shows the results for this question. The results indicated that 54.3 percent of LYMMO customers currently do not use any other Lynx services other than the LYMMO. In addition, the results indicated that in addition to using the LYMMO, 41.4 percent of customers also use Lynx standard local bus service.

Exhibit 8: Q5 - Do you use other Lynx services besides *LYMMO*?

Category	%
Standard Local Bus	41.4%
Vanpool/schoolpool/car pool	0.7%
A+ Link	1.9%
Special Event Services	1.7%
No, I do not use other Lynx Services	54.3%
Total	100%

Elements of Bus Rapid Transit

Electronic Information Station Displays

Question 8 on the on-board survey asked customers how often they use the electronic information displays at the LYMMO stations. Exhibit 9 shows the results for this question. The results indicate that the electronic information displays are either underutilized or never used by LYMMO customers, with almost 78 percent of customers sometimes or never using the electronic displays at stations (further investigation into this issue uncovered that most of the station displays have never worked properly until implementation of the Passenger Advisory System and new LCD kiosk screens).

Exhibit 9: Q8 – How often do you use the electronic information displays at the stations?

Category	%
Often	22.4 %
Sometimes	37.3 %
Never	40.2 %
Total	100%

On-Board Video Information Displays (Transit Television Network)

Contrary to findings related to the electronic information displays at LYMMO stations, the results for Question 9 that asked customers if they find the on-board video information displays useful and entertaining was somewhat more encouraging, as shown in Exhibit 10. The results for this question indicate that 82.2 percent of LYMMO customers find the TransitTV Network (formerly ITEC) on-board video displays useful and entertaining possibly adding to the BRT experience. In addition, 9.8 percent of LYMMO customers indicated that they "don't know" if the on-board video information displays are useful or entertaining. This finding suggests that

Lynx may need to "get the word out" about the on-board TransitTV Network displays and the important information that is broadcast on the system.

Exhibit 10: Q9 – Do you find the on-board video information displays useful and entertaining?

Category	%
Yes	82.2%
No	8.0%
Don't know	9.8%
Total	100%

Customers' Favorite BRT Elements

Question 7 asked customers to rank their three favorite LYMMO features from a list of typical BRT elements. The results are shown in Exhibit 11. The results indicate that customers rate the low-floor vehicles, vehicle interiors, and electronic information at stations as their three favorite features of the LYMMO BRT system.

Exhibit 11: Q7 – Rank your three favorite LYMMO Aspects.

BRT Characteristic	%
Low-Floor Vehicles	35.4%
Vehicle Interiors	15.3%
Electronic Information at Stations	11.2%
Environmentally-Friendly Vehicles	7.2%
Features of Stops/Stations	7.5%
Frequency of Vehicles	5.7%
On-Board Video Information Displays	4.5%
Easy to Use	3.9%
Fast Travel Time	3.8%
Free to Ride	3.9%
Public Art and System Design	1.6%

BRT Elements as a Factor in the Decision to Use LYMMO

Question 10 of the on-board customer survey asked riders why they selected the LYMMO for this trip. From a long list of possible responses, customers were asked to indicate all that applied to them for the particular trip in question in which they were asked to complete a survey. The results show that the number one reason that respondents elected to use the LYMMO was that it is "faster than walking" in the Downtown Orlando area. Additionally, 16.4 percent elected to use the LYMMO because it is free to ride (2nd most liked feature) and an additional 14.4

percent elected to use the service because they feel it is easy to use (3rd most liked feature). The results for Question 10 can be found in Exhibit 12.

Exhibit 12: Q10 – Why did you select LYMMO for THIS TRIP today?

Rank	Reason for Using LYMMO	%
1	Faster than Walking	27.0%
2	Free to Ride	16.4%
3	Easy to Use	14.4%
4	Parking Availability at my Destination	9.5%
5	Comfort	5.9%
6	Locations at Stations / Stops	5.9%
7	Freq. of Vehicles	4.6%
8	Faster than Driving	4.4%
9	Fun and Enjoyable	4.1%
10	Downtown Traffic is Too Bad	3.3%
11	Jury Duty	2.6%
12	Covered Stations	1.8%

Question 6 asked LYMMO customers "If you do not use other Lynx services, would you now consider using them based on your experience of using LYMMO?." Exhibit 13 shows the results for Question 6. This finding speaks well for the LYMMO service with 80.2 percent of customers indicating that they would consider using other Lynx services based on their experience using the LYMMO.

Exhibit 13: Q6 – If you do not use other Lynx services, would you now consider using them based on your experience of using LYMMO?

Category	%
Yes	80.2%
No	19.8%
Total	100%

Similar to Question 10, Question 11 on the customer on-board survey sought to find out whether or not customers' experience using the LYMMO has changed their opinion of public transportation. The results for this question are also quite encouraging. The results indicate that an incredible 52.5 percent of LYMMO customers have improved opinions of public transit as a result of using the LYMMO, as shown in Exhibit 14. This finding suggests that the premium services offered by BRT systems such as the LYMMO are changing the way the riding public views public transit services.

Exhibit 14: Q11 – As a result of your experience riding LYMMO, would you now say that your opinion of public transportation has…

Category	%
Improved → Why?	52.5%
Not changed	46.4%
Worsened → Why?	1.1%
Total	100%

Certain questions on the survey instrument afforded the opportunity to ascertain deeper relationships in the data by performing crosstabulations with certain questions. One such crosstabulation was performed with Question 5 and Question 11; the results are shown in Exhibit 15. Specifically, Question 5 inquired about the use of other Lynx services not including the LYMMO and Question 11 wanted to know if customer perceptions of public transit have changed as a result of using the LYMMO. The two most significant findings was that the opinion of public transit of 20.6 percent of standard local bus customers and 30.1 percent of customers who do not use other Lynx services (LYMMO only customers) improved as a result of using the LYMMO. Some of the reasons listed by customers for the improved opinion were the convenience, ease of use, frequent stops, and cleanliness of the LYMMO system.

Exhibit 15: Crosstabulation - Question 5 and Question 11

Other Lynx Service	Opinion of Public Transit Has…			Total
	Improved	Not Changed	Worsened	
Bus	20.6%	18.9%	0.5%	40.0%
Vanpool/schoolpool/carpool	0.2%	0.2%	-	0.5%
A+ Link	0.7%	0.6%	-	1.4%
Special Event Services	1.0%	0.9%	-	1.9%
No, I do not use other Lynx Services	30.1%	25.5%	0.6%	56.3%
Totals	52.8%	46.1%	1.1%	100%

Customer Satisfaction

Question 13 is a multi-part question that asked respondents to rate their perception of four different aspects of LYMMO BRT service, including overall satisfaction, using a five-point scale (1 = “very dissatisfied” and 5 = “very satisfied”).

Satisfaction Ratings

As noted just above, Question 13 gave respondents an opportunity to rate their individual levels of satisfaction with various LYMMO service characteristics. Using the five-point rating system's numerical scoring values, an average score was calculated for each service characteristic. The resulting mean scores give a good indication of overall customer satisfaction with each of the service aspects. Since a score of 5 indicates a "very satisfied" rating, the closer to 5 that a characteristic's mean score is, the higher the degree of customer satisfaction is with that particular characteristic.

Exhibit 16 presents all of the weighted average customer satisfaction ratings for the service characteristics included in Question 13, rank-ordered from highest to lowest. The responses indicate a very high level of satisfaction with overall LYMMO service; all mean scores fell between "satisfied" and "very satisfied," including travel time and reliability, as represented by the square area in Exhibit 17. An analysis of the very high customer mean scores and importance of the service attributes inquired about clearly shows that users regard the LYMMO BRT as a premium service. In short, Lynx has essentially raised the bar in terms of service quality for its customers through the LYMMO BRT service.

Exhibit 16: Mean Satisfaction Scores with Certain Aspects of LYMMO Service

Aspect of LYMMO Service	Mean Scores
Travel Time	4.48
Reliability of Service	4.47
Comfort	4.41
Safety	4.41
Overall	4.45

Exhibit 17: Illustration of LYMMO Customer Mean Satisfaction Scores

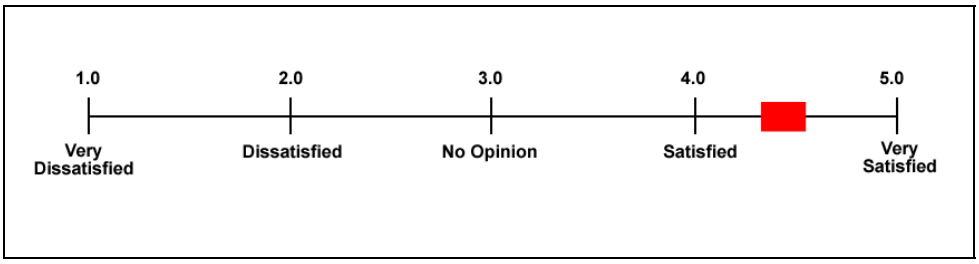

Exhibit 18 presents the frequency distributions for the LYMMO service characteristics included in Question 13 of the survey instrument. The data revealed that LYMMO customers are the

most satisfied with the travel time or the perceived timesavings. Nearly 58 percent of respondents rated the reliability of the LYMMO vehicles as "very satisfied," while 57 percent rated the safety on the LYMMO vehicles "very satisfied." All of the LYMMO service characteristics inquired about on the survey received no less than a combined 88 percent or higher "satisfied" and "very satisfied" rating.

Exhibit 18: Q13 – Please rate your satisfaction with the following aspects of LYMMO service.

Rating	Aspect of LYMMO Service				
	Travel Time	Safety	Reliability of Service	Comfort	Overall Service
Very Satisfied	58.1%	56.6%	57.4%	52.9%	54.8%
Satisfied	35.4%	32.3%	34.8%	39.3%	38.8%
No Opinion	3.6%	7.3%	5.8%	5.1%	4.3%
Dissatisfied	1.9%	2.8%	1.1%	1.6%	1.3%
Very Dissatisfied	0.8%	1.0%	0.9%	1.0%	0.9%

Exhibit 19 shows the results of a crosstabulation of Question 5 that inquired about the use of other Lynx services not including the LYMMO and Question 13 that asked customers to rate their level of satisfaction with certain aspects of LYMMO service. The crosstabulation of Question 5 and Question 13 revealed that those customers who only use the LYMMO were a combined more satisfied and very satisfied with its service aspects in relation to customers who use standard local bus service as well.

Exhibit 19: Crosstabulation - Question 13 by Question 5

Rating	Travel Time					
	Bus	**Vanpool/schoolpool/ carpool**	**A+ Link**	**Special Event Services**	**No, I do not use other Lynx Services**	**Total**
Very Satisfied	*26.9%*	0.2%	1.2%	1.1%	28.5%	57.9%
Satisfied	*11.5%*	0.2%	0.4%	0.5%	23.0%	35.6%
No Opinion	1.1%	-	-	-	2.5%	3.6%
Dissatisfied	0.4%	-	0.2%	-	1.4%	2.0%
Very Dissatisfied	0.5%	-	-	-	0.4%	0.9%
Rating	**Safety**					
	Bus	**Vanpool/schoolpool/ carpool**	**A+ Link**	**Special Event Services**	**No, I do not use other Lynx Services**	**Total**
Very Satisfied	27.1%	0.1%	0.9%	1.0%	27.4%	56.5%
Satisfied	9.8%	0.2%	0.6%	0.6%	21.1%	32.4%
No Opinion	2.4%	-	-	-	4.8%	7.3%
Dissatisfied	0.4%	-	0.1%	-	2.3%	2.8%
Very Dissatisfied	0.2%	-	-	-	0.8%	1.0%
Rating	**Reliability of Service**					
	Bus	**Vanpool/schoolpool/ carpool**	**A+ Link**	**Special Event Services**	**No, I do not use other Lynx Services**	**Total**
Very Satisfied	27.3%	0.2%	0.9%	1.0%	27.9%	57.4%
Satisfied	9.9%	0.1%	0.2%	0.5%	24.1%	34.8%
No Opinion	2.2%	-	0.4%	0.1%	3.1%	5.8%
Dissatisfied	0.1%	-	0.1%	-	0.9%	1.1%
Very Dissatisfied	0.4%	-	-	-	0.5%	0.9%
Rating	**Comfort**					
	Bus	**Vanpool/schoolpool/ carpool**	**A+ Link**	**Special Event Services**	**No, I do not use other Lynx Services**	**Total**
Very Satisfied	25.3%	0.2%	1.0%	1.0%	25.2%	52.7%
Satisfied	12.0%	0.1%	0.4%	0.6%	26.3%	39.4%
No Opinion	2.0%	-	-	-	3.2%	5.2%
Dissatisfied	0.2%	-	0.2%	-	1.1%	1.6%
Very Dissatisfied	0.2%	-		-	0.8%	1.0%
Rating	**Overall Service**					
	Bus	**Vanpool/schoolpool/ carpool**	**A+ Link**	**Special Event Services**	**No, I do not use other Lynx Services**	**Total**
Very Satisfied	26.0%	0.1%	1.0%	0.9%	26.6%	54.6%
Satisfied	10.9%	0.2%	0.4%	0.8%	26.6%	38.9%
No Opinion	1.9%	-	-	-	2.4%	4.3%
Dissatisfied	0.4%	-	0.1%	-	0.8%	1.3%
Very Dissatisfied	0.4%	-	0.1%	-	0.4%	0.9%

STEPWISE Regression

The simplest way to measure the importance that customers of public transit place on specific service characteristics is to calculate mean scores for each characteristic on some type of numeric scale (for example, a scale of 1 through 5). While there are no real discernable drawbacks to this simple method, an alternate technique to measure the importance of each service attribute is to derive importance by examining the relationship of each attribute to overall satisfaction. This methodology uses STEPWISE regression analysis to estimate the importance of each service attribute. While there is a degree of inter-correlation between each of the service attributes, this method can be used to measure the relative importance of each attribute when determining what elements or combination of elements comprise overall customer satisfaction.

The STEPWISE regression analysis enters independent factors (each service characteristic) one at a time, backwards and forwards, to determine which one has the highest correlation with the dependent factor (in this case, overall customer satisfaction). Additional independent factors are entered into the regression equation only when they make a significant contribution to the predictive power of the equation. During the process, if any of the independent factors falls below the specified criterion, it is removed automatically from the equation building process. In this case, the criterion for entering the regression equation was $p < 0.05$, and the criterion for removal from the regression equation was $p > 0.10$. The STEPWISE regression analysis resulted in all four of the service characteristics entering the regression equation, accounting for 69.3 percent of the customers' overall satisfaction with the LYMMO service. Or, put another way, these four service characteristics aided in understanding almost 70 percent of overall customer satisfaction with the LYMMO service, as shown in Exhibit 20.

Exhibit 20: Results from Customer Satisfaction STEPWISE Regression Analysis

Model Summary				
Model	**R**	**R-Square**	**Adjusted R-Square**	**Std. Error of the Estimate**
1	0.750[a]	0.563	0.563	0.473
2	0.810[b]	0.656	0.656	0.419
3	0.830[c]	0.689	0.689	0.399
4	0.832[d]	0.692	0.693	0.396

[a]Predictors: (Constant), Comfort
[b]Predictors: (Constant), Comfort, Travel Time
[c]Predictors: (Constant), Comfort, Travel Time, Reliability of Service
[d]Predictors: (Constant), Comfort, Travel Time, Reliability of Service, Safety

The first service characteristic to enter the regression equation was "comfort of the LYMMO vehicles," accounting for 56.3 percent of the equations overall predictive power. This result is not surprising given the results for Question 7 in Exhibit 11 where LYMMO customers indicated that they liked the low-floor vehicles and vehicle interiors the most, each of these an important "comfort" element and aspect of BRT service. The second service characteristic to enter the regression equation was "travel time on LYMMO vehicles." The entry of "travel time" into the regression equation increased its overall predictive power to 65.6 percent, a significant increase in predictive power. Again, this result is not too surprising given the results for Question 10 in Exhibit 12 in which LYMMO customers indicated that they elected to use the LYMMO service because it is measurable faster than walking to their destination. This finding is consistent with the "rapid" nature of BRT services such as the LYMMO. The third variable to enter the regression equation was "reliability of LYMMO service." Interestingly, this service characteristic only marginally increased the overall predictive power of the regression model. This result is somewhat hard to explain, given that customers of public transit systems typically put a high premium on vehicle reliability that includes both on-time performance and vehicle breakdowns. The same holds true for the final service characteristic, "safety on vehicles," that entered into the regression equation. This service characteristic increased the predictive or explanatory power of the overall regression equation by only 0.004 percent. All of the service characteristics are significant at the $p < 0.05$ level.

Although the R^2 –value of 0.693 is fairly high for this kind of application with only four independent factors, it is important to note that about 30 percent overall customer satisfaction with the LYMMO service is unexplained. As part of the LYMMO evaluation process, a number of focus groups will be conducted that could aid in uncovering the remaining factors related to overall customer satisfaction. Certainly, the four service characteristics included in the regression equation make it clear that they are important factors to customers of this BRT system. However, the unexplained variance of 30 percent also makes it clear that a full understanding behind the dynamics of customer satisfaction may require the inclusion of additional independent variables in futures regression analyses. These service characteristics would certainly include those present in other BRT systems or perhaps psychological factors related to customer satisfaction.

Comparisons to Previous Lynx Standard Local Bus Customer On-Board Surveys

Exhibit 21 shows the results of a comparison of current and previous on-board surveys of Lynx customers. Specifically, the exhibit compares the current LYMMO survey to the on-board surveys conducted in 2001, 1998, and 1995 of the customers of all Lynx services. Two service

aspects are compared in the Exhibit: reliability of service and customer safety. The comparisons show that current LYMMO customers are more satisfied with the reliability of service and safety than customers of all Lynx services with 57 percent rating both service aspects as "excellent."

Exhibit 21: Comparison of Lynx On-Board Surveys

Service Aspect	Rating	LYMMO	All Lynx Service (including LYMMO)		
		2002	2001	1998	1995
Reliability of Service / On-Time Performance	Excellent	57%	24%	29%	15%
	Good	35%	38%	38%	21%
	Fair	6%	25%	17%	34%
	Poor	1%	8%	11%	22%
	Very Poor	1%	4%	5%	7%
Safety	Excellent	57%	39%	28%	14%
	Good	32%	40%	35%	22%
	Fair	7%	15%	21%	40%
	Poor	3%	3%	14%	17%
	Very Poor	1%	2%	2%	4%

Conclusions

This section summarizes an on-board customer survey that was conducted in December 2001 on the Lynx LYMMO BRT system operating in Downtown Orlando, Florida. The FTA has designated the Lynx LYMMO as one of ten BRT demonstration projects. According to the FTA, it believes that only by carefully documenting and analyzing the effects of the ten BRT demonstration projects and unique features of each that it will be possible to determine which features are most effective in certain contexts such as the type of service offered, the level of transit demand, the size of the region, passenger amenities used, and other characteristics. The FTA believes that the ten BRT demonstration projects will serve as learning tools and models for other locales throughout the country and possibly the world. In order for these demonstrations to have maximum effectiveness in their respective operational capacities, the FTA believes that a consistent and carefully structured approach to project evaluation is necessary.

Examination of the various components of the LYMMO is a critical part of the evaluation of the LYMMO demonstration project. The on-board survey was conducted to assess customer perceptions, behavior, and profiles and to determine the many reasons that riders elect to use the LYMMO BRT service such as fast travel time, low-floor vehicles, vehicle comfort, ease of use, and station features. The on-board survey asked customers to evaluate various elements

of service as well as overall satisfaction, with the ultimate purpose of measuring the impacts of the LYMMO on customer perceptions. Specific questions focused on customer behavior, including trip origins and destinations, frequency of LYMMO use, and why customers elected to use the LYMMO BRT service. Questions also obtained information about the riding experiences of customer with the LYMMO. Due to the short time that customers are actually on board LYMMO vehicles while making trips (usually just one or two stops taking no longer than 1-2 minutes to complete the entire trip), standard demographic questions such as those inquiring about age, income, and ethnicity were omitted from the survey instrument. The intent behind omitting these and other standard on-board survey questions was to shorten the survey as much as possible with the hope of increasing the overall response rate and obtaining completed surveys.

Major findings from the on-board survey of LYMMO customers include:

- Regarding trip purpose of LYMMO customers, the majority of them use the system to get to their jobs and for lunch, shopping, and errands while in Downtown Orlando.

- The results indicate that the primary origins and destinations of LYMMO customers are the Centroplex Parking Garage, Courthouse, Church Street, Library, Lake Eola Park, Bob Carr Auditorium, SunTrust Bank, and Bank of America.

- Just fewer than 41 percent of customers use the LYMMO 2 or 3 times per day and make an average of 2.45 trips per day on the LYMMO.

- Just fewer than 42 percent of customers indicated that they would like the LYMMO to remain free of charge to ride.

- Most customers indicated they are only willing to pay $0.25 to use the LYMMO.

- The results indicate that 54.3 percent of LYMMO customers currently do not use any other Lynx services other than the LYMMO.

- The results indicate that the electronic information displays are either underutilized or never used by LYMMO customers with almost 78 percent of customers sometimes and never using the electronic displays at stations.

- The results indicate that 82.2 percent of LYMMO customers find the on-board video displays useful and entertaining.

- Customers rate the low-floor vehicles, vehicle interiors, and electronic information at stations as their three favorite features of the LYMMO.

- The results show that 27 percent of the respondents elected to use the LYMMO because it is faster than walking in the Downtown Orlando area. Additionally, 16.4 percent elect to use the LYMMO because it is free to ride and an additional 14.4 percent elect to use the service because they feel it is easy to use.

- The results indicate that 52.5 percent of LYMMO customers have improved their opinions of public transit as a result of using the LYMMO service.

- Customers indicate a very high level of satisfaction with overall LYMMO service; all mean satisfaction scores were about 4.41 on a 5.0 scale, falling between "satisfied" and "very satisfied" including the service elements of travel time and reliability.

- An analysis of the very high customer mean scores and importance of the service attributes inquired about clearly shows that LYMMO users regard the LYYMO BRT as a premium service. In short, Lynx has essentially raised the bar in terms of service quality for its customers through the LYMMO BRT service.

- All of the LYMMO service characteristics inquired about on the survey received an 88 percent or higher "satisfied" and "very satisfied" rating.

- Based on a STEPWISE regression analysis, the most important service characteristic to LYMMO customers was "comfort of the LYMMO vehicles," accounting for 56.3 percent of overall customer satisfaction. This result is not surprising given the results for Question 7 in which LYMMO customers indicated that they liked the low-floor vehicles and vehicle interiors the most, each of these an important "comfort" element and aspect of BRT service.

- The second service characteristic to enter the regression equation was "travel time on LYMMO vehicles." The entry of "travel time" into the regression equation increased its overall predictive power to 65.6 percent, a significant increase in the predictive power of overall LYMMO customer satisfaction.

- In comparison to previous on-board surveys of the customers of all Lynx services (including the LYMMO) for the years 1995, 1998, and 2001, the data show that current LYMMO customers are significantly more satisfied with reliability of service and overall safety compared to that of other Lynx services for these years.

Interviews with Downtown Businesses, Government Agencies, and System Partners

As part of the evaluation of the Lynx LYMMO system in Orlando, Florida, numerous written and personal interviews were conducted with principals from the Downtown Development Board, the City of Orlando, Lynx senior staff, the Florida Department of Transportation, and the Federal Transit Administration about their satisfaction with the LYMMO and views on needed improvements to the system. In addition, the interviews focused on the economic and social impacts of the LYMMO as well as accessibility to and around the core of Downtown Orlando and its impact on traffic and parking mitigation.

The interviews were conducted using a form that contained 37 open-ended questions. Respondents could either complete the form or request a personal interview conducted over the phone. A copy of the interview questions is contained in Appendix A.

The following sections provide a summary of the interviews.

Economic and Social Impacts

Most of the individuals interviewed are of the opinion that the LYMMO has increased the visibility of public transit not only in Downtown, but also in Orlando as a whole. Based on the interviews, the high visibility of the marketing strategy for the LYMMO has enlightened and exposed everyone, including non-riders, to the possibility and benefits of using public transit. Many of the persons interviewed noted that the LYMMO is a high profile and visible project with distinguishable routes (exclusive right-of-way) along the busiest corridors in the Downtown area. The corridors use design features and amenities such as streetscaping, landscaping, unique bus shelters, and planters that visually unify the downtown and integrate the LYMMO as part of the entire downtown experience. In contrast, however, other persons interviewed were less positive about the LYMMO's impact on the downtown. Some feel that the LYMMO has had some noticeable impact, but that the impact has been minimal and certainly not caused any persons to board a bus operating in standard local service (non-LYMMO service).

Many of the persons interviewed view the LYMMO as playing a vital role in the economic development of Downtown Orlando. They noted that numerous commercial and residential developments have come about due to the presence of the LYMMO. It is clear that by providing a high quality, frequent, and reliable transportation choice for downtown employees, visitors and residents the LYMMO has increased accessibility to public transit and spurred development along its route, noted some of the persons that were interviewed. As a matter of policy, the City of Orlando makes use of the LYMMO as a tool to promote development. As a result of this strategy, there are five new office buildings in Downtown Orlando with about one million square feet per building.

Downtown Orlando is the region's public transit hub and as such offers the bulk of transit service to employees and area residents. According to those persons interviewed, the availability of such transit service has allowed downtown to continue developing at a high rate. And, the LYMMO has been a key factor in many of the land-use decisions that has had a marked impact on residential development. Six new apartment communities have been constructed within easy reach/walk of the LYMMO route. Several of the persons interviewed noted that some of the existing residential development has spurred residents to ask about an East/West extension of public transit to serve the further developing areas.

Many of the persons interviewed feel that transportation is a community and social issue and that public transit's role as a transportation choice is constantly being communicated via a number of strategies. Downtown Orlando is a multi-destination point of travel and many of the persons interviewed feel that the LYMMO provides the opportunity for individuals to rid themselves of their cars when in downtown and become public transit users. Many of the persons interviewed feel that public transit is an economic engine. Because of the presence of the LYMMO, the persons interviewed feel that development is easier to sell.

Interviewees were asked to respond to the following question: "Do you think transit has effectively communicated its role not only in transportation but other community social issues?." Responses were varied: "LYMMO has tried to communicate its role over the years"; "Lynx is just now getting the message out"; "Lynx has tried to take giant steps forward, but has a long way to go"; and "Lynx buses cause more of a level of service problem than taking cars off of the road since buses are only a third full back traffic up."

One of the City of Orlando's commitments to supporting public transit is evident in the financial support it annually provides to Lynx to operate the LYMMO. This financial support translates into better service for the community by providing accessibility to jobs and services.

The City of Orlando and the DDB have for many years implemented significant physical improvements aimed at enhancing the quality of the Downtown environment. The implementation of the LYMMO project included not only the provision of a high quality public transit service but also a major program of physical improvements, such as streetscaping, landscaping, and safety. These improvements were intended to provide an attractive transit system as well as to enhance the physical appearance of the overall downtown area. A few Interviewees noted that the LYMMO has enhanced Downtown Orlando by making it much more accessible and easier to get around. In addition, they noted that it has also enhanced the quality of the environment in terms of less private vehicles on the road, utilizing environmentally-friendly vehicles for service (compressed natural gas), and the contemporary urban design features and details of the stations, vehicles, and landscaping.

Most of the persons interviewed noted that the LYMMO has been successful at enticing new or choice users. According to the on-board survey conducted by CUTR as part of the evaluation, 7.6 percent of LYMMO riders were first-time riders. This has been accomplished, in part, through aggressive marketing and by frequent and convenient service and the strategic placement of routes. Students, the next generation of public transit users, use Lynx local bus service to get to Downtown, and then use the LYMMO to get around the Downtown area. Many of the persons interviewed agreed that the LYMMO has definitely exposed non-riders to public transit, but are not sure if it has enticed them to use other Lynx services.

The following question was asked during the interviews: "In terms of overall quality of life, where do you think transit should fit within the community or budgeting priorities?" Many of the persons interviewed commented that public transit should be high on the list of community and budgeting priorities. Many feel that public transit is key to the future of any community and that most major cities have major transit infrastructure. Many of the persons interviewed would like to see higher emphasis and importance placed on transit. Interestingly, some of the persons interviewed commented that people do not know enough about public transit in Orlando. They also noted that public transit should have a dedicated funding source and each community in the region should pay their fair share for the service. They continued by noting that transit funding should be a higher priority in the community and the budgeting process since public transit impacts a community's quality of life and spurs economic development as well.

Most of the persons interviewed view public transit as an essential service since it can be the "lifeline" for some residents for access to jobs, shopping, and other municipal services.

Some of the persons interviewed noted that the certain conditions should be in place in order to support a system like LYMMO in other parts of the region: high densities (population per square mile), supportive and mixed land uses, dense roadway network, and a high level of local financial commitment. LYMMO-like systems can help other parts of the region as long as planners are realistic about ridership forecasts and density improvements. Some considerations when originally designing LYMMO were limited parking, densities, and the reduction of vehicle trips in the Dowtown.

The persons interviewed were asked to identify the right mix of conditions that need to be in place to support and justify a LYMMO-type system in other parts of Lynx's three-county service area. A summary of the responses indicates potential high ridership that could support higher service frequencies and the need to link areas due to residents/employees demand and/or to promote economic development. Other conditions mentioned to support LYMMO expansion were the addition of an East/West circulator to serve the local law school and the Federal Courthouse, private sector support/funding, and ridership figures to justify the expenditure.

About the LYMMO

When asked about the current strengths of the LYMMO, responses were mostly positive. Many of the persons interviewed noted that it provides high-quality transit service that includes high frequencies, safety, and reliability. In addition, the dedicated bus lanes and information kiosks are a real part of the Downtown Orlando environment. Interviewees commented further that the high on-street visibility of the system has had a positive effect on changing people's attitude about the need for more public transit.

The weaknesses of the LYMMO include a high local subsidy, reduction in weekend ridership, weekend headway increases, and bunching problems with some buses during the weekdays. One suggested weakness is that the LYMMO is free to ride. This person noted that there should be a 25¢ to 50¢ fare to ride the LYMMO.

The general image or perception of the LYMMO in downtown Orlando is positive. The public image is one of reliability and convenience. Many feel that the LYMMO has accomplished what it set out to accomplish – the provision of rapid and low-cost public transit. The LYMMO is seen as a very easy to use system that has been adopted as a means of travel for all people, ranging from students to professionals. Many of the persons interviewed feel that the LYMMO enhances the downtown core area and is an asset to both employees and visitors.

Specific areas of focus suggested for the next few years include expansion, operating issues, and continuing to meet transit service demands. Expansion of an east to west circulator and extension northward several blocks were also both mentioned. Among the operational issues raised were the redistribution or sharing of cost, the bunching problem, maintaining or decreasing headways, continuing proper maintenance, assigning drivers specifically to the LYMMO, and considering an alternative clean fuel source such as fuel cell technology. Additional comments included Lynx and the City continuing to seek customer input so that it understands changing needs and can address transit service demands. Likewise, Lynx and the City should continue to coordinate with the various jurisdictions to maintain an understanding of their vision for transit in the entire region.

Appropriate goals for the LYMMO in Downtown Orlando are to increase transit ridership, east-west expansion, and continue to provide high-quality transit service. If Church Street perks up many feel that the City should consider a movie theater, community events, and other amenities to increase ridership and bolster the system. By continuing to move people in an efficient and rapid manner and staying as safe as possible, it will keep a high level of interest in "the best way to move around downtown Orlando."

Many of the persons interviewed noted that the LYMMO is very easy to use. The information kiosks, service to all parking garages, fixed route, narrow headways, and demand-based schedules make it very difficult to get confused when using the LYMMO. At the stations, the electronic information displays provide useful information on bus status and station waiting time. Several persons interviewed noted that frequent riders do not make use of the information kiosk at stations since the LYMMO is so easy to use. The information kiosks are mainly for infrequent LYMMO riders such as tourists.

Customers appreciate the fact that the LYMMO is free to ride. And, many noted that this policy is a strong marketing and public relations tool. The free fare provided by LYMMO is important in the downtown area since it accommodates some riders that would instead be driving and would create higher traffic volumes in the downtown area. LYMMO's fare free system compliments the already attractive transportation option for employees and visitors.

Many of the persons interviewed felt that increasing (even nominally) the LYMMO fare would decrease ridership. An increase in the LYMMO fare would be a public relations nightmare and would need significant justification on the part of the operating agencies.

In contrast, some persons interviewed expressed that the LYMMO fare should be increased in order to partially cover operating and maintenance costs. The City of Orlando and DDB cannot afford to subsidize the LYMMO but do not want to cut service. An increase in the fare may cause ridership to decrease, but not significantly as noted by some of the interviewees.

From the interviews, two important issues came out related to Downtown Orlando businesses, employees, visitors, and residents. The first is the need for the LYMMO to continue to operate at a high level of service. The second is the continuing need for the reduction vehicle traffic in the downtown area. Many of the persons interviewed feel that the LYMMO provides a valuable transportation choice by allowing easy access to Downtown Orlando locations.

When asked to compare the performance of the LYMMO to that of the once proposed light rail transit (LRT), many of the persons interviewed noted that the LYMMO has performed as successfully as the proposed LRT for a much lower capital and operating cost. In addition, many of the persons interviewed feel that the prohibitive capital costs of LRT negated its construction in Downtown Orlando. As an alternative, the LYMMO was implemented and has outperformed LRT because of its lower capital and operating costs and flexibility.

There were mixed responses as to whether a LYMMO-type system would be supported region-wide versus LRT. Some agreed that LYMMO-type system would be supported, while others did so under certain circumstances, or even not at all. Some even felt that a LYMMO-type system would not be able to handle region-wide demand like LRT. As a downtown circulator, the LYMMO provides excellent service, however, many felt that it could not provide the high capacity and high frequency service like LRT that would eventually be needed for the region.

Accessibility and Traffic and Parking Mitigation

Many of the persons interviewed feel that the LYMMO has encouraged more public transit use and pedestrian traffic in the downtown core. Many persons noted that there are a number of people who use LYMMO exclusively rather than drive a private vehicle. The fact that the service is available and easily accessible to downtown employees and visitors encourages people to use it. Likewise, the urban amenities provided as part of the LYMMO service promote public transit and pedestrian trips in the downtown area.

In comparison to other cities, traffic congestion is not a problem in the downtown area. However, congestion is getting worse during peak hours and in certain corridors in the downtown area. In general, however, most of the persons interviewed noted that traffic

congestion is becoming more of a problem in Orlando as a whole. The level of traffic congestion in the downtown area is expected of a vibrant and major regional employment center such as Downtown Orlando. The one-way street patterns and the lack of additional periphery parking contribute greatly to downtown traffic congestion.

The LYMMO route connects to the major periphery parking garages thus helping to lessen the demand for parking in the downtown core. New parking policies such as higher parking rates at the parking garages located in the downtown core have helped to lessen traffic congestion by moving vehicles to the cheaper periphery parking garages. Many downtown employees park in the Centroplex Garage on the downtown periphery (this station accounts for the highest number of system boardings and alightings). Other visitors also use the peripheral parking garages, and then access their downtown core destination by using LYMMO.

During special events in downtown such as basketball games and concerts, the LYMMO provides special service for these events in order to alleviate auto trips and the subsequent demand for downtown parking. The LYMMO works closely with event promoters and is constantly utilized during special events. Many persons interviewed commented that the LYMMO has been very successful in providing a convenient mode of travel for special event and special purpose trips around the downtown core especially during the lunch hour and for jury duty at the courthouse.

Aspects of Downtown Orlando that people most value are the ease of getting around, friendly and clean environment, safe, numerous amenities, and cultural events. The addition of the museum has been an integral part of downtown. The LYMMO has and continues to play a role in promoting the downtown. Some of the persons interviewed noted that City leaders have done an excellent job of meshing public transit with the Downtown Orlando environment.

Several of the persons interviewed noted that the LYMMO's traffic signal system works very well. They specifically noted that there is a good balance of the timing to minimize travel delay and the station kiosks have helped to let customers know the position of buses along the route. However, a couple of persons noted that retiming of the signal system should be considered for certain intersections at peak times to give LYMMO vehicles total priority in order to decrease overall vehicle travel time.

Overall, the LYMMO, unlike its predecessor the *FreeBee*, is perceived to travel faster due to the exclusive right-of-way along the entire length of the route. Also, many persons interviewed feel that vehicle art has had an impact on the perception of the LYMMO. Almost all persons

interviewed noted that the LYMMO is a great asset to Downtown Orlando and provides a service consistent with the City's Growth Management Plan. However, many feel that the system is still underutilized and there is room for expanding ridership and service anyone who has a reason to be in Downtown Orlando.

Customer Concerns and Commendations Review

As part of Technical Memorandum Two, the project team reviewed all customer concerns and commendations received by Lynx regarding the LYMMO since inception. The following sections provide a summary of the types of customer concerns and commendations for the LYMMO by year of operation. Appendix B contains the written concerns and commendations as received from Lynx staff and Exhibits 22 and 23 shows the volume of calls by year and month.

Concerns

1993 (FreeBee)

There were a total of 14 concerns in 1993. Five of them were repeated more than once. The most frequent concern (3) was that the driver drove too fast and followed other cars to close. There were four concerns that occurred more than once. Two of these concerns had to do with how the driver operated the bus, "Driver almost hit a pedestrian" and "Driver cut off a motorist." The other two concerns pertained to how the driver treated customers. "Driver threw someone off the bus unnecessarily" was one of these complaints. The other concern is that the bus left as the customer was walking up to the bus. There were three concerns about the bus arriving on time. These concerns ranged from the wait time to how many buses were at the stops. Some of the concerns had to do with the driver's attitude. Drivers were accused of using profanity, racial slurs, not being courteous to seniors by driving off before they sit down, giving other Lynx drivers a "hard time," being rude, and driving reckless driving. Finally one person was concerned by the size of the bus. They did not feel the buses were big enough to handle afternoon traffic.

1994 (FreeBee)

The number of complaints increased considerably from 14 in 1993 to 38 in 1994. Two of the complaints pertained to the bus malfunctioning. One person was concerned that the brake lights were inoperable. As a result he almost hit the bus. The other concern stated that the A/C was not working. The person was concerned that it may in fact be working but the driver

had turned it off out of "spite." Thirteen of the concerns where about how the driver interacted with customers. Two people were concerned that the bus did not stop at scheduled stops or when the customer rang the bell. The driver flirted with a customer making her feel uncomfortable. There were several instances where the driver was perceived as being rude, either because he was not forthcoming with information or he was not courteous to seniors. One rider told the driver he was filing a complaint and the driver refused to give his last name, stating he did not have to give that information. The driver refused to allow a customer on the bus. Finally, a customer felt that when he fell boarding the bus the driver should have helped him up.

There were numerous concerns about how the driver operated the bus. The concerns are from both people riding the bus and from people who witnessed the bus being driven dangerously. For example, six people complained because they were either cutoff by the bus or saw the bus cutoff someone else. Two people felt the driver was speeding. Four people were concerned because the bus left as they were approaching the stop. Many of these people felt the driver saw them and drove off. In another example of this, the drive stopped but did not open the door to let anyone on. One person was concerned because the driver did not pull over to let people board the bus. He felt this was a safety concern because people had to walk so far into the street to board the bus. Another person was concerned that the driver did not allow people enough time to sit down before he drove off. Finally there was concern that the driver was driving recklessly. For example, one person was concerned because he witnessed the bus running through a stop sign without stopping.

Some of the concerns did not have a direct affect on the customers. One rider was concerned because the drivers ID Number was not posted. The driver was reading a newspaper at red lights, a rider noted that this was inappropriate. Three people complained because the driver had turned off the bell. Another person complained because the driver was smoking on the bus. Two people complained about the conditions on the bus. One person did not like that the homeless were riding the buses because they were using profanity. A second complaint was made after a woman sat in what appeared to be urine. Some miscellaneous concerns include a request for a new stop, concern that three buses came to one stop, and that a person waited for a bus that never showed up.

1995 (*FreeBee*)

There were significantly less concerns in 1995, the number dropped to 21. Two people felt the driver was rude. One person witnessed the driver use an obscene gesture. The driver shut the

door on a customer's arm and did not apologize. The majority of the complaints again had to do with how the driver operated the bus. Four people said the bus did not stop for them while they were waiting at a stop. Again people complained that the driver cut off other drivers (2) and was driving too fast (2). Another person felt the driver stopped too "quick." One person complained the driver was driving erratically while another said the driver jerked the bus causing a handicapped person to fall. The bus driver closed the door as someone was trying to board the bus and did not let them on the bus. There was a request for a new stop and another person stated they waited for the bus but it never arrived.

Some of the complaints had to do with the condition of the bus. A rider was concerned that the bus did not accommodate the handicapped. Another rider did not feel safe on the bus. There were numerous problems riders had with other riders. Two people complained about young people. One person felt they were behaving obnoxiously. Another witnessed a group of young people harassing an older passenger. There was some concern expressed about intoxicated riders on the buses.

1996 (FreeBee)

For 1996, one of the main concerns was the bus not stopping for waiting customers with four concerns. In addition, three customers felt LYMMO drivers were rude to them. There were numerous concerns that the driver was not operating the bus safely. While driving their personal vehicles, three persons complained that they were cutoff by a vehicle or saw a vehicle just miss another motorist. Two customers felt the LYMMO driver was driving too fast. Other operator complaints included tailgating, erratic driving, and a motorist was almost hit by a bus. One customer complained that the driver refused to "kneel" the vehicle for another customer. Last, two customers were concerned about station wait time and another felt the route needed new stops. There were a total of 18 customer concerns logged in 1996.

1997 (LYMMO)

In 1997 the total number of concerns from customers was 46. The most concerns were registered for the complaints of driver rudeness to customers (5) and driver not stopping for waiting customers (5). Other complaints about the driver included not allowing a customer to board at a traffic light (non-stop), the driver speaking poor English, and a driver taking a break while customers waited on the bus. This was the first year for the new Lynx system and it was met with a high number of concerns from customers. One person was unhappy because a *FreeBee* stop was removed when the LYMMO route was implemented. One customer stated the

concern that the LYMMO did not accommodate the elderly. There were two concerns about the LYMMO vehicles. One customer felt the temperature inside the buses was too cold and that a handrail needed to be added to the front door.

There were four complaints about how drivers operated LYMMO vehicles. Once concern was about a driver almost striking a pedestrian and another complained because he felt the driver waited too long for customers to board the vehicle (15 minutes). There was also concern from a customer that the operator did not stop at a designated stop and another driver did not stop when the stop request was activated. Other miscellaneous complaints include that a customer waited too long for the bus to arrive at a station and cars driving in the "bus only" lane (not surprising being the first year of LYMMO operation).

1998

Similar to the previous year, six customers reported driver rudeness (3) and drivers leaving customers waiting at stops. Two customers complained that drivers were driving erratically. As in the previous year, someone complained because the driver did not allow him or her to board at a traffic light (non-stop). There were two complaints about how the driver operated the vehicle. One person said the driver did not go when the light turned green and ignored passengers when they tried to alert the driver to his error. Another passenger complained when the driver missed a stop. Miscellaneous complaints included buses running late, inaccurate system map, customer almost being hit by a car because the LYMMO vehicle was parked in an undesignated area, and a strange odor on the bus that smelled like human waste. There were a total of 11 customer concerns logged in 1998.

1999

In 1999, there was a dramatic increase in customer concerns over the previous year. Once again, the majority of complaints were about how LYMMO operators interacted with customers. Six people reported that operators were rude to them and another six were concerned because operators refused to open the door. Four customers complained to Lynx because a number of operators were driving off leaving customers stranded at stops. One customer complained that an operator ignored a stop request. Since the inception of service, 1999 is the first year that customers were complaining about other customers. Two customers complained about rowdy children. Other concerns about fellow customers included overcrowding, being dressed inappropriately, and harassing customers at bus stops. There were also concerns that the

temperature inside LYMMO vehicles was too hot. Four customers complained that they had to wait too long for the bus. There were a total of 49 customer concerns logged in 1999.

2000

The number of concerns dropped to 25 in 2000. Again, the largest number of complaints was in how the driver interacted with the customers. The most concerns, 4, were that the driver left the stop as people were waiting leaving them to wait for the next bus. The second highest complaint (3) was that the driver was rude. Two people said that the driver left as they were walking up to the bus and that driver did not stop when the bell was rung. One person witnessed the driver doing chin-ups on the bus. When asked why he was doing this he responded, "to stay awake."

Two people were concerned the driver was driving erratically and one person complained he was driving too fast. The driver ran up on the curb causing people to "jump back," one customer complained. Three people were unhappy because there were rowdy kids on the bus. A passenger fell while boarding the bus. One person felt that the LYMMO station is poorly lit at night and another stated a new stop was needed.

2001

The number of concerns rose to 32 in 2001. The highest number of complaints was again how the driver interacted with passengers. The most complaints in this area (4) were that a piece of their body (i.e. legs, arms, etc.) got stuck in the door or that the driver drove off with a passenger waiting at the stop. Three people complained because the driver left as they were approaching the bus. Two people said the driver was rude to them. One customer was kicked off the bus because he was eating. Another person complained because the bus moved before he could sit down.

Three people complained the driver was driving erratically and another three said the driver drove through a red light. One person said he thought the driver was speeding while another said the bus almost struck an oncoming car. A homeless person reported that he thought the company was trying to remove the homeless from the city. A rider was scared because he saw what he thought was a "mentally disturbed" person riding the bus. A passenger fell while exiting the bus. One rider was offended by an ad he saw on the Transit Television while riding the bus.

2002

The number of concerns again dropped to 26 in 2002. As was concurrent with previous years the majority of complaints had to do with how the driver interacted with the passengers. Six people stated the driver was rude to them. Four people said the driver drove away from the stop with someone waiting. Other concerns were that the driver was on a cell phone while operating the bus and the driver did not lower the lift for a handicapped passenger.

There were four complaints about how the driver operated the bus. Two people said the driver almost hit a pedestrian. One person said the driver was driving erratically. Another person said the bus ran two red lights. The number of complaints about other riders declined from previous years as only one person complained about rowdy kids riding the bus. The bus was vandalized leading one person to complain about "racial graffiti" on the bus. Concerns were raised again about the safety of riders waiting at stops at night because of poor lighting. A passenger was upset because he could not exit through the back door. There were two vague concerns with one person saying they were disappointed with the service but did not specify why or what could make it better. Another person stated they were injured on the bus but did not say how they were injured.

2003 (partial)

In January and February of 2003 there were a total of six complaints. Three of the complaints were logged for driver rudeness and two were because the driver shut the door on a passenger. A rider said the driver was talking on a cell phone while operating the bus. Finally, a passenger complained because the driver did not stop the bus when requested.

Trend Analysis: Concerns

The most consistent complaint against the drivers was rudeness to customers. The only year where this complaint did not occur was in 1993 during operation of the *FreeBee*. The frequency of this complaint increased steadily beginning with zero in 1993 and increasing to six in 1999. There was a slight decrease in 1995 and 1998. After 1999, the frequency gradually decreased before rising again to six in 2002.

The complaints that were made between 1993 and 1997, other than "driver was rude," were almost entirely different than the complaints made from 1998 to 2002 when the LYMMO replaced the *FreeBee*. While the volume of complaints remained the same their nature

changed. For example, between 1993 and 1997 13 customers complained that drivers were "cutting-off" motorists while driving the route. From 1998 to 2002 only two people made this identical complaint. On the other hand, nine customers complained that drivers were driving in what could be described as an erratic manner. Only two people made similar complaints from 1993 to 1997. This pattern is duplicated numerous times. The complaint that drivers "did not stop with people waiting" was registered numerous times (32) from 1995 to 2002, but no one made this complaint prior to 1995. There were a number of complaints that the bus "left as a person who was walking up to the bus" during the entire period examined (13), though there were some inconsistencies. From 1993 to 1997, there were a total of eight complaints about being left at a stop by a bus. The complaints did not occur again until 2000 to 2001, when there were five similar complaints.

If the concerns are divided into seven categories: driver Interaction with customers, operation of bus, drivers actions not affecting riders, miscellaneous, problems with the bus, problems with other riders, and complaints about new system (only in 1997) you can ascertain broader trends. The majority of complaints from 1993 to 1997 pertained to how drivers were operating buses (i.e., speeding, tailgating, cutting-off motorists, almost hit a pedestrian, etc.) and driver interaction with customers. These accounted for 71 percent of the complaints during this time period. From 1998 to 2002 the majority of complaints (55 percent) were about how the driver interacted with customers (i.e., didn't open the door for passengers, shut door as people tried to board the bus, did not stop when bell was rung, etc.). The only year throughout the period examined that the majority of complaints were not associated to the operation of the bus was in 2000 when it was driver interaction with customers (57 percent).

Exhibit 22: LYMMO Customer Concerns: Volume of Calls

Year	Month	No. Concerns
1993	Jul	4
	Aug	2
	Sep	2
	Oct	2
	Nov	3
	Dec	1
Total		14
1994	Jan	3
	Feb	1
	Mar	3
	Apr	4
	May	5
	Jun	7
	Jul	3
	Aug	4
	Sep	3
	Nov	3
	Dec	2
Total		38
1995	Jan	1
	Feb	2
	Mar	2
	May	3
	Jun	3
	Jul	1
	Aug	3
	Oct	3
	Nov	1
	Dec	2
Total		21

Exhibit 22: LYMMO Customer Concerns: Volume of Calls (continued)

Year	Month	No. Concerns
1996	Jan	3
	Feb	3
	Mar	4
	Apr	1
	May	3
	Jun	2
	Aug	1
	Dec	1
Total		18
1997	Feb	1
	Apr	3
	Jun	3
	Jul	1
	Aug	14
	Sep	13
	Oct	7
	Nov	4
Total		46
1998	Feb	1
	Mar	1
	May	1
	Oct	1
	Dec	7
Total		11
1999	Jan	3
	Feb	6
	Mar	1
	Apr	6
	May	2
	Jun	2
	Jul	6
	Aug	10
	Oct	4
	Nov	5
	Dec	4
Total		49

Exhibit 22: LYMMO Customer Concerns: Volume of Calls (continued)

Year	Month	No. Concerns
2000	Jan	1
	Feb	2
	Mar	3
	Apr	4
	May	2
	Jun	1
	Aug	4
	Sep	2
	Oct	3
	Nov	2
	Dec	1
Total		25
2001	Jan	2
	Feb	3
	Mar	3
	Apr	4
	May	1
	Jun	6
	Jul	1
	Aug	3
	Sep	3
	Oct	2
	Nov	3
	Dec	1
Total		32
2002	Jan	1
	Feb	1
	Mar	2
	Apr	4
	May	3
	Jun	1
	Jul	3
	Aug	1
	Oct	3
	Nov	4
	Dec	3
Total		26
2003	Jan	5
	Feb	1
Total		**6**
Grand Total		**286**

Commendations

1997 (LYMMO)

The number of compliments was 10 in 1997. Four people complimented the driver on being courteous. Other compliments about the driver included being helpful and informative. One rider commented that he liked the bus while another said the bus was clean. A rider thought the whole system was fast and efficient.

1998

There were only three compliments in 1998. One of the compliments was internal with an operator complimenting a supervisor's professionalism. A rider stated that he experienced fast and efficient service. Another rider said that the driver was helpful.

1999

The number of compliments dropped from 3 in 1998 to 1 in 1999. The compliment was about a specific driver and the rider stated that he was Lynx's best driver.

2000

There were three compliments in 2000. All three compliments were about drivers. One passenger felt the driver was kind and understanding. Another rider said the driver was honest. Finally, a third rider said the driver was solution oriented.

2001

There was a dramatic increase in the number of compliments from 2000. The total number of compliments in 2001 was 12. The majority of the comments were about how the driver interacted with the customers. Five people said that drivers were courteous. Four people said drivers waited for people approaching the stop. Three people said that drivers were helpful. One passenger said he enjoyed the TV screens on the bus. Another passenger witnessed a driver helping a person in a wheelchair. Finally, a driver returned an item that a passenger had left on the bus.

2002

There was only one compliment in 2002. This was a significant drop from the 12 compliments in 2001. One rider stated that a driver was courteous.

Trend Analysis: Commendations

Compliments were first collected in 1996 during the last year of *FreeBee* operation. The number of compliments has fluctuated greatly between 1996 and 2002. The largest number recorded was in 2001 with 12. The smallest number was in 1999 with just one compliment in July. The most frequent compliment during the time examined was "driver was courteous," which occurred 24 percent of the time. The frequency of this compliment fluctuated greatly during the period examined. It did not register until the second year examined, when four customers registered the compliment. Twenty-one percent of the compliments were for "driver was helpful." The frequency of this compliment also fluctuated throughout the period examined. It began at three in 1996 and dropped to one in 1997. After remaining at one in 1998 it rose to five in 1999 then falling to zero for two years. In 2002, it rose again to 3. More than half (55 percent) of the overall compliments were related to positive interaction between drivers and customers.

Exhibit 23: LYMMO Customer Commendations: Volume of Calls

Year	Month	No. Concerns
1996	Feb	1
	Mar	1
	May	1
Total		3
1997	Aug	4
	Oct	5
	Nov	1
Total		10
1998	Sep	1
	Oct	2
Total		3
1999	Jul	1
Total		1
2000	Aug	1
	Oct	1
	Dec	1
Total		3
2001	May	6
	Jul	1
	Aug	3
	Sep	2
Total		12
2002	May	1
Total		1
Grand Total		33

Discussion and Focus Groups

Methods

Two focused group discussions were conducted with community leaders and members of various advisory committees to discuss their experiences, perceptions, and recommendations related to the LYMMO service. The focus group moderator contacted potential participants via telephone or e-mail, explained the purpose and nature of the study, and invited potential participants to attend. Those who expressed interest in participating were scheduled for one of the two consecutive evening discussions. This point of contact aided in establishing a rapport between the participants and the moderator prior to the group meetings.

The focus group sessions were limited to a two-hour time block, and the topical discussion lasted approximately one and one half hours. A single questioning route for the two focus groups was developed based upon LYMMO technical documentation and the purposes of the evaluation. These data were used to compose the focus group questions and in-depth probes.

Both sessions were tape-recorded, and the assistant focus group moderator compiled detailed notes during each meeting. Participants also completed an anonymous and confidential demographic information form for statistical and classification purposes.

Participant Demographic Information

A total of five participants attended the two groups sessions—one female and four males. Three participants recorded their age in the 45 – 54 category and two reported to be in the 55 – 64 age group. Ethnicity was self-reported, and three participants characterized themselves as white or Caucasian, one reported to be Japanese, and one participant did not respond to this question. Each participant reported that she or he is married. There is an average of 2.4 persons per household and at least two working vehicles in each household. All participants reported a total household income of $50,000 or more. Participants have been in the Orlando area an average of 19 years. With regard to personal use of the LYMMO service, all five participants reported that they have used LYMMO in the past six months, and three reported that they use the service at least once per week.

Summary of Focus Group Results

Usage and Perceived Benefits of the LYMMO Service

With the exception of one attendee, all of the participants work in the Downtown Orlando area and are quite familiar with the LYMMO service. Most reported frequent usage for special events at the Orlando Centroplex, personal errands, lunches, or business meetings. In addition, one participant who lives in the immediate Downtown area uses LYMMO services in the evenings, typically for entertainment and dining purposes. The single participant who does not work in Downtown Orlando claimed limited knowledge regarding LYMMO, and admitted using the service very few times.

Some participants believe that LYMMO ridership is particularly high in the morning hours because of the number of (potential) jurors parking within the Orlando Centroplex garages and traveling to the Orange County Courthouse. They claim to have noticed the vehicles filled to

capacity with seated and standing passengers while transporting (potential) jurors. Furthermore, these participants believe that reported overall ridership estimates may be inaccurate because of this segment of passengers, particularly if estimates are based on morning ridership. Were it not for the (potential) jurors, one participant questioned the operating hours of LYMMO, claiming the buses are often empty during the day and that evening service may not be warranted.

Participants generally agree that Downtown Orlando workers comprise LYMMO's primary ridership. The fact that peripheral parking facility fees are substantially less than are the fees at more centrally located facilities is considered to be an advantage for this group. Workers are therefore able to park at lower rates and use LYMMO to access various employers within the city center. Several participants noted they are also aware of co-workers in their respective workplaces who utilize the LYMMO frequently and are pleased with the service. However, one participant noted the opposite, stating he often reminds co-workers to use LYMMO rather than drive for short trips within Downtown.

Although all of the group participants drive personal vehicles and do not generally utilize other Lynx services, in some instances the LYMMO is considered to be more convenient than is personal vehicle use. Respondents particularly favor using LYMMO as special event transportation to and from the Orlando Centroplex because parking in the immediate area is limited during large or simultaneous events. Participants also noted the convenience of not having to move one's car and search for parking during the day, claiming they realize both a time as well as an economic savings by using LYMMO.

Some participants stated they believe Downtown Orlando has experienced overall benefits because of the LYMMO service. For example, each person that is using LYMMO equates to one less car traveling already congested city streets. While it is difficult to measure decreases in overall congestion accurately, one participant noted, LYMMO at least provides a valuable alternative to personal vehicle use. Other participants were not like-minded, however, expressing the opinion that traffic congestion has worsened because LYMMO's dedicated lane resulted in the loss of an existing traffic lane. One attendee explained that LYMMO's bi-directional lane operation is confusing to other drivers, who often mistakenly enter the LYMMO lanes. This same participant went on to claim that LYMMO's signal timing also contributes to traffic congestion because the buses are given priority.

In further consideration of how Downtown has benefited from LYMMO, one group participant asserted that LYMMO has been of great benefit to Orlando's burgeoning cultural arts district,

providing easy access to art galleries, museums, and theatres. Furthermore, LYMMO makes a significant contribution to the city's transit environment as Orlando experiences rapid revitalization, development, and expansion.

When queried as to their opinions regarding LYMMO's fare-free policy, some participants expressed full support. They assert that despite increasing operational costs, the fare-free policy is logical and of benefit to the community as well as to LYMMO. Furthermore, these same participants contend it is imperative to the long-term success of LYMMO that the service continues to be provided to riders at no charge. Fares, regardless of how minimal, are considered unfeasible because of LYMMO's limited service area. These participants also believe that fares would be contrary to the goal of providing quick and seamless Downtown transit service.

In contrast, some participants believe that charges of ten to 25 cents per boarding would provide needed revenue, and could perhaps dissuade "the people that you don't want on it" from riding LYMMO. This statement was made in reference to the perception that the presence of homeless persons or teenagers on vehicles may negatively affect ridership. Some participants claim that homeless persons in the Downtown area often board LYMMO to escape the elements, find a comfortable place to rest, or to make trips to service agencies.

These participants also note that other passengers, particularly women, may feel anxious with regard to their personal security and may avoid using the service altogether. They stated that in their own experiences, there are occasionally offensive odors on the vehicles, which are attributed to homeless passengers. In addition, groups of teenagers, often carrying skateboards or boom boxes, may be perceived as threatening to other passengers or make them generally uncomfortable. Furthermore, homeless and teen passengers may contribute negatively to the overall image of LYMMO, fostering the perception that the service is for low-income populations or that it is "beneath" the average Downtown commuter. Despite these opinions, participants do not advocate the institution of a LYMMO fare policy.

Appearance and Comfort of Vehicles, Stations, and Stops

During discussions with group participants the appearance of LYMMO vehicles, stations, and stops received a generally favorable appraisal. Participants mostly agree that LYMMO vehicles are distinct from other Lynx vehicles and that the "public art" on many of the bus exteriors is attractive. There is some concern, however, regarding the bus windows being covered rather than clear or tinted. Some participants contend that this creates an "unfriendly" environment

for potential passengers, one noting that covered windows make LYMMO vehicles "look like a prison bus."

A few participants believe that females traveling alone or after dark may be hesitant to board the bus because they are unable to see inside, which may result in feelings of insecurity and the decision to not use the service. It should be noted that the single female participant did not express this concern, however she was not a participant during the session in which the topic was raised.

LYMMO vehicles are also considered to be quite comfortable for passengers and "very nice." Participants have observed that the buses are clean and well maintained, and the seating is comfortable. The onboard entertainment and news are considered to be appealing amenities.

With regard to LYMMO stations and stops, the participants generally agree that they are attractive, functional, adequate, and they are distinctive from other Lynx stops. One participant did note there is an "ongoing maintenance challenge" with LYMMO stations and stops due to problems such as graffiti and teens that use the areas for skateboarding.

Service Aspects of LYMMO

Participants were also queried about their opinions regarding the service aspects of LYMMO. The frequency of service is generally considered to be adequate and a distinct advantage of LYMMO compared to regular fixed-route transit services. However, a few participants expressed concern about the feasibility of the current level of LYMMO's frequency in less traveled areas of Downtown. One participant suggested that 30-minute headways during off-peak hours would be sufficient in locations such as parking garages where there may not be a constant flow of potential riders during the day. Another participant noted that although LYMMO may be convenient at times, Downtown Orlando is so small in area that walking is sometimes a better option if the bus is not readily available, stating "I will be able to walk to wherever I wanna go before that LYMMO bus shows up." Others in the discussion groups felt differently, claiming that the frequency of LYMMO is quite convenient for the trips they make and they are pleased with its frequency of service.

All participants consider LYMMO's electronic information at stations and onboard vehicles to be a valuable service feature. Several participants believe that scheduling information is more accurate now that station kiosks have been upgraded to utilize GIS capabilities. They note that in their personal experiences, LYMMO buses arrive within the displayed amount of time. Other

participants, however, question the accuracy of the electronic information, claiming they have made first-hand observations that buses do not adhere to the displayed updates. These participants admit to making a "game" out of testing the LYMMO service with regard to the displayed timing, and will begin walking away from the station to note how much time has elapsed when the bus passes them on the street.

Finally, LYMMO drivers received a positive evaluation. Even before being asked about this aspect of service, several participants remarked that drivers are friendly and courteous, and other participants concurred with these statements.

Participant Recommendations for Improvement

Group participants were asked about their recommendations for making improvements to the LYMMO service. Strategic marketing received overwhelming attention. Attendees unanimously concur that the marketing of LYMMO should be more aggressive, with several asserting that many Downtown workers are ignorant of the service details despite seeing the vehicles on a daily basis. Several noted that when LYMMO was first introduced to the Orlando community there was a flourish of attention and promotional campaigns. Over the years this vigor has faded, and participants recommend a return to marketing strategies that will draw attention to the service and the benefits it offers. Some participants explained they believe marketing is particularly important as Orlando continues to develop, and Downtown revitalization efforts bring new workers, residents, and visitors to the area. Those who have begun working or have moved into Downtown since the introduction of LYMMO may not be aware of how it operates, how to use the service, the route, and may have other similar gaps in knowledge. Some participants suggest aggressive marketing and ongoing education, particularly to this group of potential users.

Focus group participants also generally agree that the LYMMO route should be reevaluated, as Downtown Orlando has experienced tremendous change in the eight years since the original route began. Corporate recruitment, new business construction, changes in land use, new housing, new traffic patterns, and general revitalization efforts have all had an effect on the transportation needs of Downtown workers, residents, and visitors. Participants assert that LYMMO must also change and serve the destinations to which potential passengers want to travel. Some participants suggested collaborating with major Downtown hotels in determining service needs, with the intent of attracting conventioneers and tourists.

A few participants note that an east-west route will soon be necessary, given the current rate and nature of development in the area. They explained that in a recent pilot study of such a route, although it was off to somewhat of a slow start, there was an outcry of disappointment when the evaluation period ended and the service was removed. They also stated there is a steady flow of requests for expansion of the LYMMO system. Overall, the participants agree that the LYMMO route must be evaluated and expanded according to current needs if the service is to be an effective mode of alternative transportation in Downtown.

Focus Group Conclusions

Because there were only five participants in the two focus groups, it is difficult to extrapolate participant opinions to those of the general public. However, because the group participants are considered to be community leaders involved with a variety of committees and organizations that are concentrated on planning and development issues, their opinions have been formed not only by personal experience but by the tone and attitude of the Orlando community as well. Therefore, their contributions are considered valuable because they, in some sense, speak for the community.

The divisions between the two groups illustrate the political aspects of transportation decision-making. Participants were not recruited for one or another group based on their community or organizational affiliations; they were given their choice of meeting times. However, the two groups became divided into somewhat a "pro" and a "con" group, those with a more negative perspective going so far as to state that if the service were discontinued there would only be a "small minority" that would notice or care. The differences that emerged were somewhat logical when considering the special interests represented by an individual's job duties, committee responsibilities, or personal interests. Two members of the first group were somewhat more negative regarding LYMMO than were the two members of the second discussion group. The participant with admittedly the least knowledge regarding the LYMMO service attended the first group, and naturally was influenced to a degree by the negative tone of the other two group members.

Although there were varying opinions offered during the two focus group discussions, there was overall consensus on the following points:

- The current LYMMO route should be expanded to serve new areas of Downtown commercial and residential development.

- Although there were strong promotional campaigns when the service began, LYMMO is currently suffering from a lack of aggressive marketing and requires ongoing promotion and education.
- Efforts to increase ridership should be expanded.
- The LYMMO service should remain free of charge to passengers.
- LYMMO drivers are friendly and courteous.
- Vehicle interiors are comfortable and well maintained.
- Although many of the vehicle exteriors are attractive, they could be designed better and maintained more regularly.
- Vehicles, stations, and stops are distinct from other Lynx services.
- If it is accurate, the electronic information is appreciated and valuable.
- LYMMO contributes to the overall transit environment of Orlando and will be important to its future.

Participants widely agree that LYMMO is a good idea for Downtown Orlando, but that it requires ongoing assessment regarding its effectiveness and its usefulness to the area. As Downtown continues to develop and change, participants believe that transit services, including the LYMMO, must be responsive to those changes if the needs of this rapidly expanding metropolitan region are to be served.

Appendix A: Interview Questions

INTERVIEW QUESTIONS
Lynx LYMMO Evaluation

Economic and Social Impacts

1. Do you feel that the LYMMO has increased the visibility of public transit in Orlando?

2. Do you think the LYMMO has played a role in the economic development of Downtown Orlando? If so, why? If not, what role does it play?

3. In the areas of new commercial and high-density residential development, how do land use decisions impact the need for transit services and how has the LYMMO contributed to these decisions?

4. Do you think transit has effectively communicated its role not only in transportation but other community social issues?

5. Has the LYMMO enhanced the quality of the Downtown Orlando environment?

6. In your opinion, has the LYMMO been able to entice non-transit users to use the LYMMO buses and other Lynx services?

7. In terms of overall quality of life, where do you think transit should fit within the community or budgeting priorities?

8. Do you see transit as an essential service (police, fire, EMS) or a discretionary municipal service?

9. What would be your primary conditions for supporting a system like the LYMMO in other parts of the region?

10. What would be your primary conditions for supporting expansions and improvements to the LYMMO in the future?

About the LYMMO

11. What are the current strengths of the LYMMO?

12. What are the weaknesses of the LYMMO?

13. What is the image or perception of the LYMMO in Downtown Orlando?

14. What specific areas do you think Lynx needs to focus on in the next few years to improve the LYMMO?

15. What do you think are appropriate goals for the LYMMO in Downtown Orlando?

16. Do you feel the LYMMO is easy to use, either based on actual use or your perception?

17. Do you use the electronic information displays at stations?

18. Do you think other persons are making use of the electronic information displays at stations?

19. What do you think of the LYMMO fare being free?

20. Should the LYMMO fare be increased?

21. Regarding the LYMMO, what are important issues to Downtown Orlando businesses, employees, visitors, and residents?

22. Do you think the LYMMO has performed as successfully in Downtown as you might have envisioned light rail performing?

23. In comparison to light rail, do you think that the LYMMO has been a cost-effective alternative?

24. Comparing light rail to the LYMMO, would you support more LYMMO-type systems in the region?

Accessibility and Traffic and Parking Mitigation

25. Has the LYMMO encouraged more transit use and pedestrians in Downtown?

26. Do you feel that there is a traffic congestion problem in the Downtown Area?

27. Has the LYMMO increased mobility and accessibility to major Downtown destinations?

28. Has the LYMMO lessened demand for parking in Downtown core?

29. Do you think the LYMMO has had an impact on special events with regard to alleviating auto trips and downtown parking? If yes, why? If no, what role does it play with regard to special events?

30. Do you feel that the LYMMO has provided a convenient mode of travel for special purpose trips in the Downtown including lunch, shopping, Jury Duty, and other personal business? If yes, how successful has it been?

31. Listed below are the major components of the LYMMO BRT system. On a scale of 1 (best) – 5 (worst), please rate the following aspects in order of importance to the overall success of the system? Each ranking can be used more than once.

Ranking	LYMMO Aspect
	Frequency of Vehicles
	Free to Ride
	Fast Travel Time
	Easy to Use
	On-Board Video Information Displays
	Features of Stops & Stations
	Environmentally-Friendly Vehicles
	Electronic Information at Stations
	Public Art and System Design
	Vehicle Interiors
	Low-Floor Vehicles

32. What aspects of Downtown Orlando do people most value?

33. How can LYMMO play a role in promoting those values?

34. Should the traffic signal prioritization system be reimplemented to make the LYMMO vehicles even faster?

35. Whom do you think the LYMMO primarily serves?

36. Whom should the LYMMO primarily serve?

Other

37. Any final comments that you'd like to share about the LYMMO?

Appendix B: Written Customer Concerns and Commendations

Exhibit 24: LYMMO Customer Concerns: Written Comments

2/24/1997	Customer writes: The female handicapped passenger got on the bus and the black female operator told her that she could not hook in her wheelchair and that she was not allowed to put the strap through the wheels so she only put the strap around her.
4/8/1997	Customer writes: She and her son boarded the bus and did not see the elderly woman who was about to get off. She caught her son and told him to move to the side so the woman could get off. The operator then yelled at her son.
4/9/1997	Customer writes: The operator passed her up in front of Magnolia Towers. There was an also elderly customer waiting.
6/20/1997	Customer writes: The operator was sitting at lights and reading the newspaper. The bus was teal, maybe 450 or 453. Customer is an executive at the downtown development board and called Bill Schneeman directly.
6/27/1997	Customer writes: Bill Schneeman reported that a Lynx employee witnessed the operator on bus #453 eating Frito's and reading the newspaper while driving. Operator described as a short stubby male.
8/5/1997	Customer writes: He just took the LYMMO and the worst driver ever was on it. The driver was "bitching" at the customers and would not stop long enough at the stops for customers to get off the bus.
8/4/1997	Customer writes: She was not aware that the freebee was changing to the LYMMO. She stated she rides the freebee a couple of times a week and did not see any signs or flyers. Customer was shocked on Monday and feels that the service is now inconvenient.
8/5/1997	Customer writes: He works at the St. George Orthodox church and loves the LYMMO. The only thing is, that the talking bus does not acknowledge the location of his church, only the library.
8/11/1997	Customer writes: The LYMMO service takes about twice as long to get to their destination in the morning to work than the freebee service. They got on the LYMMO bus at the garage at 6:45 am and did not get to work until 7:05 am.
8/13/1997	Customer writes: She works in the building located at 255 S. Orange Avenue. Today, a pedestrian got hit by a LYMMO bus. The very next bus came by speeding and customer is concerned that someone else is going to get hurt if these bus drivers do not slow down.
8/15/1997	Customer writes: He wanted to take the LYMMO to Magnolia and Church. Customer rang the bell but the driver did not stop. Customer asked him to stop and the driver rudely told him it was not a stop.
8/8/1997	Customer writes: "After finally arriving at the designated spot, we found that we had just missed the bus. So, we waited, and waited. The second problem that we encountered was lack of room on this new bus.
8/20/1997	Customer writes: She was taking 12 3-4 year olds on a trip on the LYMMO. They had 2 adults with them. They went to the second LYMMO bus and the driver told them to go to the first one. The female driver acted like she did not want them on her bus.
8/25/1997	Customer writes: "The LYMMO has tuned us out. We live south of Anderson and South street. Too busy to risk crossing. (I live at the Westminster Towers)"
8/25/1997	Customer writes: She was in the far left lane on Hughey and turning left onto Livingston. She had a green light. This

	LYMMO bus began turning as well and almost caused an accident. Caller feels that the triggers of the traffic and LYMMO lights need adjustment.
8/25/1997	Customer writes: It takes entirely too long for her to get to her work at the Sheriff's office. She got on the bus at 6:43 and it did not leave until 6:50 am. She states that it is ridiculous to have to take a bus any earlier than 6:45 to be at work.
8/25/1997	Customer writes: The bus pulled up to the station at Jefferson and Magnolia but did not stop. Customer stated he did not ring the bell because he thought this was a mandatory stop. Customer had to go to the next stop and walk back.
8/26/1997	Customer writes: He is an attorney with an office in downtown orlando. He and an associate were on the LYMMO and the driver did not slow down or even start to stop at the station at Jefferson/Magnolia. Customers yelled for him to stop.
8/29/1997	Customer writes: He had worked all night and noticed the LYMMO traveling southbound on Magnolia. He walked to the corner of Central and Magnolia where there is a bus stop sign. The driver pulled up to the stop and said, "take the next bus."
9/3/1997	Customer writes: The new LYMMO service does not serve the old people. She used to be able to take the freebee and go to the bank and pay her bills and go to eat. Now she can't do anything. She feels that whoever planned it planned just for the young.
9/2/1997	Customer writes: "We here on Anderson Street just cannot understand why the freebee was taken away from the old folks? They cannot walk or cross streets. They are willing to pay the 25 cents that the old folks pay.
9/10/1997	Customer writes: She entered the freebee garage at 6:40 am and was approaching a LYMMO bus when it took off. Customer felt that the operator should have waited. Another bus came a couple of minutes later and she boarded but the bus did not leave.
9/11/1997	Customer writes: She works downtown and took the LYMMO bus to go to lunch. The driver's behavior made the entire bus feel uncomfortable. The driver was very rude. A group of passengers were boarding the bus from the back doors and the driver was yelling.
9/11/1997	Customer writes: He works at Bell South and does not really like the LYMMO because he has to walk a further distance than the freebee to get on the bus.
9/11/1997	Customer writes: He boarded the bus from the rear door along with several other customers. The female operator turned to them and went crazy stating, "under no circumstances should you board from the rear door."
9/16/1997	Customer writes: She was downtown with her two daughters when their car broke down. They saw a LYMMO bus go by so they went to a LYMMO station. They waited for almost 25 minutes but a bus did not come by.
9/17/1997	Customer writes: A driver has a bad attitude and is very rude to customers. She states that on several occasions they have taken her bus and the driver treated the people on the bus as if they were vagrants. Yelling and screaming at them.
9/22/1997	Customer writes: A bus had just loaded a passenger and had pulled up a couple of feet to the light as she was running for the bus. She got to the door and knocked but the driver would not let her board. Customer states that she is a tax payer.
9/23/1997	Customer writes: He ran for the bus and that the driver shut the doors but had not taken off. He knocked on the

	door. The driver shook her head and would not let him board. The bus stayed there another full 30 seconds before the light changed.
9/25/1997	Customer writes: She arrived at the garage at 6:40 am. She boarded the bus then the female driver got off the bus and took a break. Customer could not understand why she would to this with a bus full of people waiting to leave.
9/18/1997	Citizen writes: "I cross Magnolia Avenue at least twice every weekday. While I know that you have been attempting to educate the public about the LYMMO's "bus only" lanes on that street, I still see many cars driving in those lanes, and I am concerned.
9/30/1997	Customer states: He used the LYMMO today and was approaching the stop when the female bus driver told him to take the next bus. Customer did not understand why so he called information.
10/7/1997	Customer writes: "As a downtown resident I would like to forward a few thoughts on the new LYMMO system. First, let me start off by saying Lynx is the best bus system I have ever ridden on.
10/7/1997	Customer writes: She and another female were walking toward bus parked at the LYMMO stop at Central and Magnolia. The driver did not wait for them to get to the stop and board. In fact, the driver almost ran them over leaving the stop.
10/13/1997	Customer writes: There were 2 buses in the LYMMO garage. She boarded the first bus. They sat there for 15 minutes before departing. A Lynx employee kept boarding the bus and counting the people. Customer does not know why this bus waited for 15 minutes.
10/14/1997	Customer writes: He was running for the bus. The bus was stopped at the traffic light. The operator would not open the door. Customer states that he is a doctor and was embarrassed in front of all of the people on the bus and the street.
10/16/1997	Customer writes: She rang the bell to get off at the new courthouse stop. She then walked to the front of the bus. The driver slowed down but did not stop. Customer asked why he did not stop.
10/21/1997	Customer writes: He was leaving the post office when he saw the LYMMO bus picking up people at that stop near Jefferson and Magnolia. As he walked toward it, the driver shut the door and nudged up to the traffic light. Customer tried to board but the driver did not open the door.
10/26/1997	Customer writes: She is new to using the bus system and she was trying to get information and help from the driver. The driver did not speak very good English and did not seem interested in trying to help her.
11/11/1997	Customer writes: She is 74 years old and was at the LYMMO stop at the corner of Livingston and Orange. The driver was going to pass her up. She waved her cane and the driver stopped. When she boarded the bus the driver stated, "you weren't at the stop."
11/12/1997	Customer writes: Mr. Knowles states that he and other passengers were waiting to take the LYMMO to the arena and a few LYMMO drivers just went by and did not pick them up the drivers kept on pointing to the next bus behind them.
11/25/1997	Customer writes" "I asked the driver if he would please turn down the air because it was so cold. I was told that he could not. I said that I was not the only one that was cold and asked if he could he do something, he said no.
2/6/1998	Customer writes: Customer suggests that the information sheet for the LYMMO kiosk be changed for the federal building. The way that the map shows it gives the appearance that the LYMMO drops off directly in front of the federal building.

3/9/1998	Customer writes: Customer states that the LYMMO buses were not following their schedule and that there were 3 buses right behind each other and they were running late. Customer depends on the LYMMO service and is not very pleased. It has caused him to be late for work.
5/6/1998	Customer writes: She got on the LYMMO service twice and that bus # 910 has a very offensive odor on one of the rear seats on the right side of the bus walking towards the rear. Says the odor smells like human waste.
10/22/1998	Customer writes: On 10-21 at 6:25 a.m., myself and another women were walking to the bus in the parking garage. The women ahead of me was approaching the bus and the driver took off.
12/7/1998	Customer writes: Bus was stopped and Richard was 2 steps from the door but in clear view of the operator - the bus driver looked right at him and took off. He feels that was deliberate and rude. The bus driver (operator #103) was a short heavy white man.
12/10/1998	Customer writes: Driver wouldn't go on the green light and customer said, "the light is green." Operator ignored her. She indicated that she has called on this before and nothing has been done and is threatening going over Daniel Whitefield's head.
12/18/1998	Customer writes: I got on the LYMMO bus #0648 from the post office about 9:45am and the bus driver said to me - "Your last trip, only one ride a day with me... You heard that? I said, you heard that?" he said to me. This is a free bus!
12/29/1998	Customer writes: This driver is rude, reckless, and inconsiderate. I have never complained about anyone before, but this time I had to. Even when there is room on the bus, he shuts the door right in peoples' face. He stops and starts with jerks.
12/30/1998	Customer writes: This driver must be the unhappiest person in your employ. He is very rude to all the riders. He speeds down the road and then applies the brakes abruptly. Anyone who is standing usually stumbles or is running into someone standing next to them.
12/31/1998	Customer writes: Customer was upset over the fact the LYMMO driver would not open the door before light changed to allow her on bus. Said this driver also would not allow 2 elderly ladies board.
12/31/1998	Customer writes: Operator missed stop after the other customer rang the bell. Operator let this woman off by the library in a non-designated area and a white car came by the right of the bus and almost hit the woman as she stepped off the bus.
1/8/1999	Customer writes: Customer called to report what she witnessed an older business man, 50-60 yrs. old, dressed in a white shirt and a tie, wanted to get on the bus and had stepped out in front of the bus at the light. The driver honked and hollered at him and took off.
1/14/1999	Customer writes: Operator was sitting at the stop with the newspaper across his wheel with the door closed. My friend and I were just about to knock on the door when he pulled forward and stopped and then opened the door. She asked him, "Did you not see us standing there?"
1/15/1999	Customer writes: The bus slid past the stop and the customer and 2 others got up to the door and the bus took off. They weren't happy.
2/3/1999	Customer stated: She was very upset over the fact that she was leaving the LYMMO garage and trying to catch the bus and the driver drove-off. Said that she sat outside of the courthouse 1 day and waited 20 minutes for a bus.
2/4/1999	Customer stated: He was waiting for the LYMMO on Magnolia Avenue when the LYMMO arrived, both doors opened,

	and he was attempting to board the bus through the rear door. He had to knock on the rear door after the driver closed it.
2/8/1999	Customer writes: Customer said was sitting on the bench when the LYMMO approached and drove away.
2/22/1999	Customer writes: Customer stated that on 2-22-99, she was on her way to a Magic game with a friend. They waited over 20 minutes for a LYMMO bus. There were 3 LYMMO buses parked with an "out of service" on the display.
3/24/1999	Customer writes: Customer stated that she finished work at 6:30 pm and went to wait for the LYMMO. Said that she waited for 10 minutes and when the bus didn't come by after 10 minutes, she started walking. Said that she saw about 2 to 3 buses going by in the opposite direction.
4/1/1999	Customer writes: This is my 2nd written complaint on this individual employed by your company. She is the rudest, most inconsiderate driver, not to mention unsafe. Numerous times she has deliberately driven off when I approach her bus. She has on every stop refused to wait at the light (courthouse stop) for people when they are just a few feet away or less than 10 seconds. She will look at her side mirror and see people walking and purposely pull away.
4/22/1999	Customer stated: She had just alighted the LYMMO with co-workers and was crossing Orange Avenue near the courthouse and the driver (female, blond hair) blew the horn at them, moved the bus forward a bit towards them, and then pointed up at the traffic.
4/24/1999	Customer writes: She is 84 years old and that she was walking towards Jefferson and Magnolia to catch the LYMMO. Said that the LYMMO driver (female) was stopped when she reached the stop, but would not open the door to allow her on the bus.
5/11/1999	Customer writes: It is with much regret I feel required to file a complaint against a driver who was rude and unprofessional in refusing to allow me to board the bus.
6/28/1999	Customer writes: She asked the driver, "Are you going to central?" and the driver responded, "Where do you think I am going?"
7/2/1999	Customer writes: He jumped on the LYMMO and inadvertently threw a quarter into the fare box to which the driver said, "the LYMMO is free!" in a very rude tone of voice.
7/12/1999	Customer writes: At the post office stop, traveling back to the courthouse, I stepped onto the bus, but before I could get on the driver closed the doors on my fingers and left me off balance almost causing me to fall back onto the side.
7/15/1999	Customer stated: She is disabled and that she was riding the LYMMO bus and requested a stop near the tech college. Customer said that the driver kept going passed her stop and went to the LYMMO garage.
7/20/1999	Customer writes: Bus #910 was very hot because the air-conditioning was not working and was told by the driver that he had reported the problem to maintenance.
8/3/1999	Customer writes: I am a frequent rider of the Lynx bus system (the LYMMO). The bus system is wonderful, I usually ride the LYMMO from the Centroplex parking garage to my job. Recently i have noticed some very rude drivers.
8/6/1999	Customer writes: Customer said that the LYMMO driver was driving very fast and reckless and that she and the 2 other passengers were very much scared.
8/9/1999	Customer writes:

	Customer said that while riding the LYMMO, a group of school kids got on and where very disruptive. Customer said that a female co-worker was pushed by one of the kids and they all thought it was funny.
8/26/1999	Customer writes: He went to get on the bus and the driver shut the doors on his face causing his glasses to be knocked off onto the ground. Customer picked up his glasses and tried to board the bus again and the driver closed the doors and drove away.
10/5/1999	Customer stated: She got on LYMMO bus #907 at Church and Orange Avenue. Customer said good afternoon could you please wait for the two ladies at the crosswalk? Customer said that the driver (older male) just looked at her closed the door and drove off.
10/6/1999	Customer writes: She had just left the courthouse to catch the LYMMO and that the LYMMO approached and allowed one passenger off through the rear door but didn't bother to open the front door and passed her up.
10/28/1999	Customer stated: She was approaching the LYMMO on Church & Orange when she got close to the LYMMO, the driver closed the door and left.
11/4/1999	Customer stated: While riding the LYMMO, she was approached by a male and female asking for money. Customer stated that she told them that she didn't have any money and they kept harassing her until finally she went to the driver.
11/13/1999	Customer stated: He had just come from the post office and got on the LYMMO. Customer said that when the LYMMO reached Church Street, the driver told him that had to get off the bus because he was at the end of the line.
11/22/1999	Customer stated: She got on the LYMMO at the rear door and she placed her hand on the door to keep it from closing. Customer said that when this happened the door closed on her and hit her on the side of the head.
11/29/1999	Customer writes: Riding the Lynx bus could be a hazard. The major problem is in the morning at the arena. The bus drivers jam-pack the buses so that everyone is crowded right on top of each other. All seats are taken and people are standing in the isles.
12/9/1999	Customer writes: As she was disembarking, another customer was boarding. Just as the boarding customer got on, the operator closed the door and caught her shoulder bag. At the same instance the door closed, the operator pulled away.
12/11/1999	Motorist stated: While she was sitting at the light at the intersection of Livingston and Hughey, she noticed a Lynx bus driven by a female motioning to other motorist to move out of the way.
12/17/1999	Customer writes: I am a daily rider of the LYMMO route downtown and I, along with other riders, have been wondering where the LYMMO buses have gone. Certainly, those $350,000 vehicles aren't breaking down already.
1/13/2000	Customer writes: Customer reported an incident in which the driver (older white male, grey hair) was very rude.
2/9/2000	Customer states: Customer left a voicemail message stating that she observed the driver (white male) doing chin-ups on the cross bar inside the bus. Customer said that the driver stated that he was doing chin-ups because if he didn't, he would fall asleep.
2/25/2000	Operator states: Operator spoke about the policy for the LYMMO. Operator uses the Amelia parking lot and goes through the gate near Livingston to get the LYMMO. Even though there is not a stop there, most the LYMMO operators have picked up operators there.
3/6/2000	Customer writes:

	Customer reported that the driver, first name Linda, pulled off before she could board the bus.
3/6/2000	Customer writes: She saw the LYMMO waiting for the light and attempted to board when the driver (female) shrugged her shoulders and drove off leaving her at the stop.
3/30/2000	Customer writes: Could the freebee bus come all the way down to Colonial Drive? I work on Magnolia and park and sometimes would like to walk/lunch in downtown. But by the time I get to the Sentinel building and return it is over my lunch hour. Please?
4/6/2000	Customer stated: She was on the LYMMO when she asked the driver to let her off at the temporary LYMMO stop before Suntrust. Customer said that the driver became real rude and told her that he would have to make a wide turn and kept going passed the stop.
4/13/2000	Customer writes: I wanted to bring to the attention of Lynx the driving habits of a particular driver. Customer stated that on a number of occasions the driver has been speeding and making fast and sudden stops.
4/23/2000	Customer writes: I don't understand why the LYMMO driver stopped to let me cross street in front of him and go back to the LYMMO stop and then leave without me? Can they please wait 30-60 seconds near Church, Jackson and Magnolia?
4/25/2000	Customer writes: Customer is extremely upset over the behavior of the students from Howard Middle School. Customer feels that Lynx should be able to do something to stop the students from disturbing the other passengers on the LYMMO service.
5/2/2000	Customer states: Customer left voicemail message stating that the driver didn't stop like he should have. Customer said they customers had to jump back when the driver went over the curb.
5/3/2000	Customer stated: The driver stopped near the library and would not allow four young black kids on the bus.
6/12/2000	Customer reported: LYMMO bus #906 was jerking real badly.
8/7/2000	Customer writes: Last week, I was obviously running for the bus, when I was no more than 15 feet away. Your "rude" driver shut the door, practically in my face, acted like he didn't see me, even though I saw him watching me run to the bus, and drove off.
8/11/2000	Customer stated: She saw the LYMMO bus approaching and the driver opened the doors but didn't stop and kept going.
8/14/2000	Customer stated: She was attempting to board the LYMMO through the front door when some how her right leg got caught underneath the bus and she fell. Customer stated that the driver (white female, blond hair) asked her if she was ok?
8/18/2000	Customer stated: She was waiting for the LYMMO and when the bus arrived, the driver (older male, graying hair) opened the door to allow another passenger off the bus and then closed the door in her face and drove off.
9/8/2000	Customer writes: The bus taking us to the parking garage had turned into a zoo. The kids from school take up seats with their book bags, so we have to stand. They fight, throw food, gum and hard candy. They scream, push to get off and are rude.
9/8/2000	Customer writes: School children are riding the bus at approx. 4:30 pm and they fight, yell, throw things at each other and so on! This bus is to transport business people and tourist and local Orlando residents.
10/5/2000	Customer writes:

	Caller reported that the LYMMO station is not illuminated at night.
10/27/2000	Customer stated: She and about six other customers got to the stop the same time as the LYMMO and the driver would not open the door. Customer said that the driver waved and drove off.
11/28/2000	Customer writes: She was crossing the road along with young school kids when Lynx bus #906 approached and stopped to allow them to cross. Caller said that as they were crossing and directly in front of the bus, the driver (male) started to move.
11/9/2000	Customer writes: The driver of bus stopped to pick up passengers at courthouse stop. Four passengers including myself were running from courthouse to the bus. As we got to rear of bus to board, the back door was closed.
12/18/2000	Customer reported: The driver is very rude and has a real bad attitude. A couple of days ago, the driver was blowing his horn at a female in the cross walk.
1/24/2001	Customer stated: When the LYMMO reached the courthouse as she was alighting the bus, the driver closed the door on her and it caught her right arm. Customer said that the driver saw what happened and never said anything or apologized.
1/31/2001	Customer stated: When the LYMMO arrived, she waited for the rear door to open. Customer said that the rear door opened and as she was about to enter when the door started to closed on her hand. Customer said that when she informed the driver.
2/14/2001	Customer states: The driver of this bus #455 jerks the bus and hit the brakes. Customer said that the driver was speeding and tailgaiting another bus. Customer strongly suggests that this driver not be allowed to continue on the LYMMO route.
2/12/2001	Customer writes: Upon entering a full bus, I sat down near the back door on the opposite side of the door. Seated next to me was a woman who appeared mentally disturbed.
3/14/2001	Customer stated: While riding the LYMMO, she requested a stop near the old Barnett building. Customer said that the driver went passed the stop and when he stopped, he stopped near the driveway. When she stepped off the bus, she fell and injured herself.
3/20/2001	Customer writes: The female driver of bus #908 (long brown curly hair with glasses) drove into the oncoming bus lane in order to prevent a car from driving in the bus lane. This could have easily led to an accident if the car hadn't stopped quickly.
3/20/2001	Customer writes: The driver of bus #902 did not stop at the bus stop. I was standing behind the second seat/post to keep out of the wind. The driver drove across Orange Avenue and didn't even pause at the stop.
4/4/2001	Customer writes: Her boss just called her and said that he was waiting with another passenger at the LYMMO stop and the bus #910 just went right pass them.
4/20/2001	Customer stated: He approached the LYMMO bus parked at the Centroplex garage and was attempting to enter through the rear door. Customer stated that just as he stepped on the bus the door closed and caught his left shoulder and arm.
4/23/2001	Customer stated:

	Either Wednesday or Thursday of last week, he was told to get off the LYMMO bus by the driver. Customer admits that he was eating a piece of orange and didn't hear the driver when he said no eating allowed on the bus.
4/25/2001	Customer stated: The driver of this bus is leaving her on purpose. Customer said that every time she goes to catch this bus, the driver see her coming and leaves her at the stop.
5/16/2001	Customer stated: He got on the LYMMO and entered through the front door. Customer stated that the driver closed the door on him and half his body was caught in the door. Customer said that he yelled for the driver to open the door.
6/8/2001	Customer writes: She was walking along when she observed Lynx bus #904 become very rude and aggressive with a motorist that had mistakenly got into the LYMMO lane. Caller said that the driver got right up on the bumper of the vehicle and was blowing his horn.
6/26/2001	Customer reported: While riding the LYMMO along with three of her female colleagues, a she witnessed a very offensive advertising in a Best Buy commercial.
6/28/2001	Customer stated: He had made a stop request for South Street and the driver kept going. Customer said that he went to driver and asked him why didn't he stop? Customer said that the driver didn't respond and took him to the next stop.
8/1/2001	Customer stated: He was waiting at the Washington and Magnolia Station when he saw LYMMO bus #906 run right through the light and kept right on going passed the LYMMO station.
7/25/2001	Customer stated: The driver (white male) moved the bus before she could be seated and she lost her balance and fell on a male passenger in a wheelchair. Customer said that some of the other passengers yelled out to the driver.
8/24/2001	Customer writes: I boarded the bus at Livingston by the Marriot and a woman driver (50's, blond curly hair) made a left at the light without it being green.
8/31/2001	Customer stated: He was almost across the road and was very close to the LYMMO bus and the driver saw him coming and would not wait for him.
9/19/2001	Customer stated: The LYMMO was stopped at the courthouse stop when he saw two females running for the bus. Customer said that as the driver (short, balding, goatee) was about to drive off, he yelled out for the driver to wait.
9/26/2001	Customer stated: He is a homeless person, the driver will intentionally pass him up and has done this on a number of occasions. Customer said that the driver will run the light to avoid picking him up.
10/15/2001	Customer reported: This driver has a bad attitude and needs someone to talk to her about her attitude. Customer stated that he observed this driver a number of times exhibit bad behavior.
10/26/2001	Customer reported: A cab had inadvertently got into the LYMMO lane. Customer said that the driver (white male) didn't give the taxi time to get out of the lane, the driver just kept coming forcing the cab to take evasive action by running up onto the curb.
1/5/2002	Customer writes: I have frequently been disappointed by what constitutes Lynx "service," and sometimes I believe

	that your company's services are intended to punish those of us who can't drive.
2/23/2002	Customer stated: While riding the LYMMO bus when the bus was approaching Magnolia and Washington, he made a stop request. Customer stated that the bus stopped, but the rear door wouldn't open.
3/22/2002	Customer reported: This driver was yelling at an elderly couple for walking against the light. Customer said that the couple was probably not aware of walking against the light.
4/4/2002	Customer stated: When he boarded the LYMMO, the driver was on his cell phone and when he was getting off near the Nations Bank, he mentioned to the driver about being on a cell phone and the driver told him "to get the hell off the bus!"
4/9/2002	Written comments: Kids misbehavior on bus today prompted 3 adults to complain. They complained about these kids before.
4/17/2002	Customer states: This driver intentionally moved away from the stop to avoid picking up passengers. Customer said that the light had not changed when the driver closed the door and would not allow other passengers to board the bus.
4/27/2002	Customer reported: He and a co-worker were walking towards the LYMMO stop when he was almost run over by the bus. Customer stated that they were crossing the road to catch the bus when all of a sudden he heard his co-worker yell to look out.
5/14/2002	Customer comments: This morning at 7:51 a.m. the downtown LYMMO driver closed the door on bus #907 (painted with the U.S. flag) and drove through the Washington Street intersection southbound as I was within 3 feet of the door, obviously attempting to board that bus.
5/30/2002	Customer states: Caller left a voicemail message stating that he observed LYMMO bus #909 run a traffic light at Magnolia and Jefferson, then again at Magnolia and Robinson.
7/8/2002	Customer writes: Caller reported that the bus stop has racial graffiti written on it.
7/9/2002	Customer writes: Wheelchair customer stated that when the bus arrived, the driver told him he didn't want to take the time to lower the lift. Customer stated that the driver told him the next bus would be along in about 2 minutes.
7/19/2002	Customer writes: I am writing in regards to LYMMO bus driver #1305. This man has a very nasty attitude and is very unprofessional, when it comes to his job and the way he treats passengers on the "free LYMMO route."
8/22/2002	Customer stated: As he approached the LYMMO, the driver was about to leave. Customer stated that someone must have told the driver that he was there and she opened the door. Customer stated that when he boarded the bus the driver became very rude.
10/21/2002	Customer stated: The driver is extremely rude and will intentionally leave customers at the stops. Customer stated that the driver was stopped and she knocked on the door and the driver would not open the door and drove off.
10/24/2002	Customer writes:

	I've worked in downtown Orlando for many years and have always used the free local bus services. From the freebee to the LYMMO, the service has always been a time saver and welcome relief from long walks in the rain.
11/5/2002	Customer states: The driver (male) of this bus was very rude to a homeless man. Customer said that the homeless man was waiting at the stop and when the driver stopped he was giving him a very difficult time. Customer feels that this is not right.
11/9/2002	Customer stated: She was escorting about 8 girl scouts when they saw the LYMMO bus approaching the stop. Customer said that they waved to the driver to get attention and he just waved back and kept going.
11/14/2002	Customer writes: Customer is a homeless female that was injured on the LYMMO when a truck pulled out in front of the bus. Customer said that the driver (female) slammed on the brakes to avoid hitting truck and she fell on the floor.
11/15/2002	Customer comments: Customer left a voicemail message stating that he had just got off the LYMMO near the courthouse and was standing in front of the bus trying to cross the road. Customer said that the driver began blowing the horn and waving his arms.
12/2/2002	Customer comments: Caller is with the Orange County traffic Management Center and she reported that a Lynx supervisor reported that the lights were out in the LYMMO shelter. Caller said that Orange County is not responsible for the lighting in the shelters.
12/11/2002	Customer comments: Caller left a voicemail message stating that Lynx bus # 907 driven by a female almost ran him over while trying to cross the road.
12/28/2002	Customer writes: I recently had a problem with one of your LYMMO drivers. His operator #0781.
1/6/2003	Customer reported: Once again this driver closed the door on him and was rude to him. See case # 01 10 335. Customer said that this driver is constantly giving him dirty looks.
1/8/2003	Customer writes: Caller works in a doctor's office located on North Magnolia Avenue. Caller stated that she has noticed over a period of time the very discourteous behavior of the LYMMO drivers that encounter vehicles that had inadvertently got into the LYMMO lanes.
1/7/2003	Customer stated: The driver is very unprofessional and he jumped out of his seat as if he was going to attack him. Customer said that the driver is also passing stops.
1/17/2003	Customer stated: The driver was on a cell phone and passed her requested stop.
1/20/2003	Customer stated: When he boarded the LYMMO at the stop near the post office and before he could sit down the driver moved the bus and he hit his head real hard. Customer said that the driver didn't ask him if he was ok.
2/3/2003	Customer reported: The driver (female) was in such a hurry to leave the stop, she closed the door on her and she injured her arm.

Exhibit 25: LYMMO Customer Commendations

8/4/1997	Customer writes: Caller stated that he just rode the new LYMMO bus and thought that it was wonderful. However, he stood up before the bus stopped and feels that he could have fallen. He thought that it might be a good idea to put up a sign stating to hold on to something.
8/5/1997	Customer writes: Caller stated that she wanted to praise our LYMMO system and the new drivers. She said that she and a friend were riding and that she was very impressed. Two women drivers were very friendly and helpful to everyone on the bus. She didn't want to leave.
8/7/1997	Customer writes: Customer stated that she witnessed this female driver on the LYMMO stop the bus, get off, and walk up to an elderly woman who needed assistance. Customer felt that was above and beyond the call of duty. Customer stated operator was most courteous.
8/27/1997	Customer writes: I served on jury duty yesterday and had the opportunity to use the LYMMO service for the first time. Loved it! Nice, new, clean buses, courteous drivers, fast and efficient service. Although I work downtown every day I rarely get out.
10/8/1997	Customer writes: "On Wednesday night I was leaving St. James Cathedral after my three boys were done with their choir practice. They suggested that they ride the LYMMO bus around at night. I said yes and to them this was a thrill.
10/16/1997	Customer writes: "I rode the LYMMO one night and we asked the LYMMO driver questions and she answered them while she was driving. She was great her name was Gail driver #757."
10/16/1997	Customer writes; "I rode the LYMMO bus at night. Our driver Gail #757 she was cool. She told us everything about the LYMMO!"
10/16/1997	Customer writes: "I am writing this letter for LYMMO bus driver number 757. Her name is Gail. I really enjoyed the ride. She explained everything to us. Now I know how the LYMMO bus works. Thank you for reading this letter."
10/29/1997	Customer writes: Customer stated that he and his wife had gone to the Bob Carr for a play but it was canceled. They decided to take a ride on the LYMMO. They boarded the bus and were greeted by "Gail" operator 0757. Gail proceeded to provide them with a great tour.
11/1/1997	Customer writes: "I'm sure that most of the email and calls you receive are critical, so I wanted to take a moment to congratulate you on the smooth performance of the LYMMO system for last night's magic game, despite it being the opening of a season.
9/22/1998	Customer writes: Operator W. Mollfulleda wanted to compliment the professionalism exhibited by the LYMMO supervisors' J. Polk, J. Thompson, A. Calhoun. These supervisors are ready to assist and do what ever it takes to accomplish their jobs.
10/25/1998	Customer writes: "On a trip to Orlando last week, we had to make use of your LYMMO and lynx services. One driver on the LYMMO proved to be particularly helpful - driver #757 a nice lady who guided us around town with a smile. Thank you for employing her.
10/29/1998	Customer writes: "The free line is doing a great job transporting convicts with their lawyers to court.
7/19/1999	Customer writes: Customer stated that driver #1030 is one of the best drivers that lynx has.

8/7/2000	Customer writes: I just wanted to say "kudos to the driver of LYMMO bus #910 today (8/7/00)." I did not get his name but I am so grateful to him. He is kind, honest and understanding and very much solution oriented.
10/6/2000	Customer writes: I really wish I had noticed this operator's name. I have to tell you, I am a mass transit advocate. When I travel, I love to try other city's mass transit and see how it works or doesn't work!
12/14/2000	Customer writes: Congratulations to driver #855 on his promotion to supervisor. As a lynx customer for over 10 years, I have ridden with driver #855 on the freebee and LYMMO and found him to be an excellent driver and very friendly.
5/15/2001	Customer writes: John is always smiling and waits for the workers to cross the street to make it to the bus stop. He's helpful to those who aren't familiar with the city.
5/15/2001	Customer writes: John, driver #928, has always been very helpful and courteous to me either on the LYMMO or on a regular lynx bus run. I have been riding lynx buses since 1986.
5/15/2001	Customer writes: The driver John #928 has been very courteous and friendly every time I have ridden on his bus. He will wait for that last passenger unlike most of the others. I have been within 5 feet of the door when others will close the door and drive off.
5/16/2001	Customer writes: John is a nice driver, he knows his regular riders, and waits for you when he sees you in sight, he greets us and is very polite and friendly. I enjoy riding with him every morning.
5/22/2001	Customer writes: John Serrano is a great driver. He is very friendly and professional. He greets his passengers with a smile at all times. I enjoyed having John on the LYMMO route and look forward to seeing him again!
5/25/2001	Customer writes: Caller wanted us to know she appreciated that Gail found and handed in her keys that were left on the LYMMO bus.
7/27/2001	Customer writes: Lynx employee said that driver was very helpful in allowing him to board the bus in his wheelchair before the rush of other passengers on the bus. Driver was very helpful and he really appreciated her assistance.
8/14/2001	Customer writes: A LYMMO passenger wanted to convey a compliment to one of the drivers. She works for "ACPS" and got off the LYMMO at same stop as I. She wasn't sure about the name, but thought it was Steve. He was on duty August 14th around 2:00 PM.
8/21/2001	Customer writes: The driver was very professional and courteous to all passengers. She saw me running from bus stop on Central and Magnolia near the museum. As it started to rain, she waited the 60-70 seconds it took me to cross over and opened doors.
8/28/2001	Customer writes: The screens on the downtown circulator and the bus that give the news/weather/etc. Love em!!!!! (Smart move!)

9/6/2001	Operator writes: I am a LYMMO bus operator and would like to commend another operator. On September 6th, Maurice Orellana, #1191, was waiting at the Central and Magnolia LYMMO bus stop as were a large group of students. Maurice could have just driven off.
9/12/2001	Customer writes: My office overlooks Magnolia and the Methodist Church. I just witnessed a Lynx LYMMO bus stop for two limousines approaching the church for a funeral. He waited until they passed and then continued. I just want to say that I noticed it.
5/27/2002	Customer writes: This is to let you know I greatly appreciate the extra effort on the part of this driver in helping me get to my destination. "J" as is on her name tag, took the time to explain and show me where I needed to go.

Lynx LYMMO
Bus Rapid Transit Evaluation

Technical Memorandum Three: Project Assessment and Evaluation: System Assessment

Contract BC-137-17

Final Report

Prepared for the

Federal Transit Administration and Florida Department of Transportation

By the

National Bus Rapid Transit Institute

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List of Exhibits

Introduction

One of the main goals of the Federal Transit Administration's (FTA) Bus Rapid Transit (BRT) Demonstration Program is to determine the effects of BRT demonstration projects through a detailed evaluation process. While not one of FTA's ten designated BRT demonstration projects, the Lynx LYMMO was chosen by the FTA for evaluation due to its Intelligent Transportation Systems (ITS) and as a model for the implementation of similar BRT systems. According to the FTA, it believes that only by carefully documenting and analyzing the effects of the BRT projects and unique features of each that it will be possible to determine which features are most effective in certain contexts such as the type of service offered, the level of transit demand, the size of the region, passenger amenities used, ITS, and other characteristics to ultimately increase the usage of public transport. The FTA believes that various BRT projects will serve as learning tools and models for other locales throughout the country, and possibly the world. In order for these BRT projects to have maximum effectiveness in their respective operational capacities, the FTA believes that a consistent and carefully structured approach to project evaluation is necessary.

In addition, the FTA wants to examine specific impacts of various BRT projects. These impacts include the degree to which bus speeds and schedule adherence improve; the degree to which ridership increases due to improved bus speeds (the linchpin of BRT operation), schedule adherence, and convenience; the effect on other traffic; the effect of each of the components of BRT on bus speed and other traffic; the benefits of ITS/APTS applications to BRT project; and the effect of BRT on land use and development. In order to meet these objectives, the FTA understands that it will be necessary to collect a variety of different types of data on several aspects of BRT projects, including measurable impacts to BRT customers via a comprehensive surveying process.

The purpose of this evaluation is to document and evaluate the LYMMO service as one of the newest applications of BRT service in the U.S. The National Bus Rapid Transit Institute (NBRTI) in partnership with Lynx, FDOT, and FTA is conducting an objective evaluation of the LYMMO and realization of community goals since inception of the LYMMO in August 1997.

Objective

Technical Memorandum Three (3) provides an objective assessment of the LYMMO's various technology applications, financial feasibility compared to alternate transit modes, operational performance via a ridecheck, and performance of the LYMMO since its inception. The intent of Technical Memorandum Three is to evaluate the effectiveness and benefits of the LYMMO, identify current performance strengths and weaknesses, effectiveness of technology in meeting original project goals, and the benefits of the LYMMO to the Downtown and Central Florida

community. Technical Memorandum Three builds upon the information gathered as part of Technical Memorandums One and Two.

Technical Memorandum Three contains the following sections:

- Financial Assessment,
- Operational Performance,
- Technology Assessment, and
- Project Effectiveness.

Financial Assessment

Using information obtained from Lynx, the Downtown Development Board (DDB), and the City of Orlando, CUTR conducted a financial assessment of the LYMMO in two areas: (1) the initial cost of the LYMMO BRT system versus the comparable cost of rail construction, and (2) the operational costs of the LYMMO versus the previous *FreeBee* downtown shuttle. The intent of the assessment is to demonstrate the viability of the LYMMO (and, hence BRT as a mode) as a bus alternative to a fixed-guideway system such as light rail (LRT). The financial assessment also contains an analysis of the operating costs per hour, mile, and passenger of the LYMMO compared to the previous *FreeBee* downtown shuttle.

One of the principal advantages of the LYMMO is that the net operating and capital cost is considerably lower than other transit mode choices such as LRT for Downtown Orlando. The LYMMO balances rapid service with higher capacity and low operating and capital costs.

One of the principal objectives of the LYMMO system was to provide high-quality LRT emulation with rubber-tired vehicles in exclusive right-of-way at a significantly lower capital investment than other fixed-guideway transit modes. The development of a sound financial plan was vital to its implementation. The original financial plan was the result of a six-year effort of coordination and interaction between the FTA, the City of Orlando, FDOT, and Lynx. Many funding alternatives were explored during this period. The capital costs for the LYMMO included FTA Discretionary Funds authorized under Section 3 of the Federal Transit Act with matching funds provided by the City of Orlando and the FDOT. The City of Orlando manages the construction and funds the operation and maintenance of the LYMMO. Lynx operates the LYMMO under an operations agreement with the City of Orlando.

Capital Costs

The funding partners included the FTA, City of Orlando, State of Florida, and Lynx for construction of the LYMMO. The respective contributions of the funding partners are shown in Exhibit 1.

Exhibit 1: Sources of LYMMO Capital Funds

Funding Partner	Original Commitment	Fiscal Year			Totals
		1994-1995	1995-1996	1996-1997	
City of Orlando	$313,750	$750,000	$1,865,000	$1,443,375	$4,372,125
State (FDOT)	$313,750	$750,000	$1,865,000	$1,443,375	$4,372,125
Federal (FTA)	$2,510,000	$3,000,000	$6,616,750	$0	$12,126,750
Totals	$3,137,500	$4,500,000	$10,346,750	$2,886,750	$20,871,000

As shown in Exhibit 1, the total capital cost for the LYMMO project was approximately $21 million. The capital costs are associated with the acquisition and construction of the various LYMMO components such as vehicles, stations, stops, right-of-way, signage, and various ITS/APTS technologies. Unit capital costs for the various system components are not available from the either the City of Orlando or Lynx. However, based on the total capital cost of $20.871 million, the capital cost per mile is $6.957 million per mile. Unfortunately, according to Lynx, the *FreeBee* downtown circulator, which the LYMMO replaced, was not tracked via separate financial records. Therefore, no comparisons of capital costs can me made between the LYMMO and the *Freebee*, though the *FreeBee* consisted only of buses and shelters with no infrastructure improvements to the roadway.

LYMMO and BRT and Light Rail Comparisons

According to the General Accounting Office (GAO), the capital costs for Bus Rapid Transit (BRT) systems were generally lower than Light Rail capital costs in the cities reviewed, when compared on a cost-per-mile basis. The GAO states clearly that BRT capital costs vary considerably, depending on the type of BRT system under consideration. Costs of the various BRT projects include the cost of the roadway (busways, exclusive bus lanes), station structures, park-and-ride facilities, communications and improved traffic signal systems, and vehicles, if additional or special buses are needed for the BRT system. Given the variety of ways in which BRT systems can be designed and configured, the GAO classified the BRT systems into three broad categories: busways, bus-HOV lanes, and BRT on arterial streets. According to these definitions, the LYMMO BRT system is hard to place in one of the three categories. Based on

these categories, the LYMMO fits somewhere between a busway and bus-HOV lane BRT system. The LYMMO operates within exclusive bus lanes on at-grade arterial streets. This type of right-of-way is not nearly as construction and capital intensive as busways that are essentially separate highways (very similar to interstate highway in construction) for buses. The GAO calculated that BRT capital costs averaged about $13.5 million per mile for busways and $9.0 million per mile for bus-HOV lanes using 2000 dollars. In comparison, the capital cost per mile for the LYMMO was $6.957 million per mile in 1997 dollars and about $7.2 million in 2000 dollars (used GDP Deflator); several million dollars less than the capital cost per mile of BRT bus-HOV lanes and considerably less than the capital cost of busways. Additional comparisons between the LYMMO and various LRT projects show that the LRT per mile capital costs are significantly higher than that of the LYMMO. Since 1980, capital costs for LRT averaged about $34.8 million per mile, ranging from $12.4 million to $118.8 million per mile, when escalated to 2000 dollars, according to the GAO. On a capital cost per-mile basis, the three different types of BRT systems have average capital cost that are 39 percent, 26 percent, and 2 percent of the average cost of the LRT systems reviewed by the GAO.

One of the principal objectives of the LYMMO system is to provide high-quality LRT emulation with rubber-tired vehicles in exclusive right-of-way at a significantly lower capital investment than other fixed-guideway transit modes. Based on this review of capital costs per mile for various BRT and LRT projects, the LYMMO achieved its goal of a lower net capital cost per mile than the various other transit mode choices such as LRT for Downtown Orlando. The LYMMO balances both rapid services with higher capacity and low capital costs.

Operating Costs

The revenue generated by the City of Orlando for the operation and maintenance of the LYMMO is allocated from the Parking and Enterprise Fund. In addition to the LYMMO, this Fund also supports the development and operation of downtown parking facilities and it also supported the *FreeBee* downtown circulator.

Operation and maintenance costs include operator salaries, fuel, vehicle maintenance, and facilities maintenance such as stations/stops and exclusive bus right-of-way. Exhibit 2 shows the total operation and maintenance cost for the LYMMO for fiscal years 1998 to 2002 as well as three operating ratio measures.

Exhibit 2: Operation and Maintenance Cost for the LYMMO by Fiscal Year

Fiscal Year	Total O & M Cost	Passenger Trips	In-Service Hours	In-Service Miles	O & M Cost per In-Service Hour	O & M Cost per In-Service Mile	O & M Cost Per Passenger Trip
1998	$1,198,925.23	1,137,938	140,580	128,255	$8.53	$9.35	$1.05
1999	$1,234,889.20	1,135,736	140,580	140,388	$8.78	$8.80	$1.09
2000	$1,066,318.27	1,134,275	140,580	141,358	$7.59	$7.54	$0.94
2001	$1,196,420.64	1,068,781	140,580	141,358	$8.51	$8.46	$1.12
2002	$1,096,778.36	1,056,459	140,580	140,610	$7.80	$7.80	$1.04

Note: O & M = operation and maintenance.

Operating Cost Per Vehicle Hour

To determine operating cost per in-service hour of vehicle operation, the annual operating costs were divided by the number of hours the LYMMO vehicles operate in a year. This measure shows the average cost to operate a LYMMO vehicle for one hour, regardless of the number of passengers carried. As shown in Exhibit 2, using this measure, the LYMMO cost $7.80 per in-service vehicle hour to operate in FY 2002.

Operating Cost Per Revenue Mile

Operating cost per in-service mile is another way of measuring the cost of operating individual LYMMO vehicles. Operating cost per in-service mile is a vehicle's annual operating cost divided by the total annual number of miles traveled while actually in passenger service. It calculates the average cost of the vehicles to travel one mile. As shown in Exhibit 2, the LYMMO cost $7.80 per in-service mile (revenue mile) to operate. By comparison, information from the 2001 National Transit Data (NTD) indicates that the operating expense per revenue mile is $4.35 for Lynx's directly-operated fixed route motorbus service (includes the LYMMO service).

Operating Cost Per Passenger Trip

Transit operating costs can also be measured on a per passenger trip basis. Operating cost per passenger trip measures the total annual operating cost divided by the total annual passenger boardings, regardless of whether the passenger is transferring from a bus to another bus, or vice versa. Thus, it shows how much it costs to carry a person on a trip, regardless of the length of that trip. Using this measure, as shown in Exhibit 2, the LYMMO cost $1.04 per in-passenger trip to operate. By comparison, information from the 2001 NTD indicates that the operating expense per passenger trip is $2.37 for Lynx's directly-operated fixed route motorbus service (includes the LYMMO service).

Capital Costs

The City of Orlando studied and evaluated numerous alternatives for improving transit service in the Orlando downtown before deciding on the implementation of the LYMMO. Each alternative transit service was evaluated as part of a screening process to identify potential trolley, bus, and TSM (Transportation System Management) options. The evaluation process considered the following:

- Ridership,
- Capital cost,
- Operating cost,
- Downtown orlando goals,
- Enhanced regional mobility,
- Environmental impacts, and
- Transit service impacts.

Based on this evaluation, one no-build alternative, one TSM alternative, one Best Bus alternative, and four fixed guideway alternatives were recommended for consideration. A summary description of the alternatives including the no-build option is presented in the following paragraphs.

No-build Option

With the No-build Alternative, the current level of transit service provided by the *FreeBee* was to be maintained In Downtown Orlando.

Alternative A-1- TSM

The TSM Alternative consists of all of the improvement of the No-build Alternative plus direct interface with the existing Lynx regional transit terminal. The TSM Alternative also assumed that Lynx will expand its services to provide more express service to the downtown terminal from newly constructed regional transit centers and park-n-ride lots as proposed in the City of Orlando's Growth Management Plan.

Alternatives A-2 – Best Bus and Best Bus Modified

The Best Bus Alternative assumed that all enhancements from the TSM Alternative would be implemented along with exclusive bus-only lanes within the downtown area. In addition, special buses would be used with some traffic management techniques to increase transit

efficiency and ridership. The Best Bus Alternative route was to include 13 stations or circulator stops that were to serve low-floor buses for the handicapped accessibility. Further refinement in the Best Bus Alternative resulted in the Best Bus Modified Alternative that included changes in the southern alignment and station locations.

Alternatives B, C, D, and E – Fixed Guideway

Alternatives B, C, D, and E consist of four fixed guideway alternative alignments that circulate within Downtown Orlando. These alternatives would include electrically powered (via overhead wires) steel wheeled vehicles operating on fixed rails. Each fixed guideway alternative varies by the area served and the existing streets utilized. It was envisioned that that a special trolley would be developed to accommodate the unique needs of the Downtown Orlando environment.

The ridership forecasts and projected capital and operating/maintenance costs for each alternative are shown in Exhibits 3 through 5.

Exhibit 3: Estimated Ridership for Each Transit Alternative

Alternative	1995 Ridership		2010 Ridership	
	Daily	Yearly	Daily	Yearly
A-1 (TSM)	1,340	355,400	4,880	1,261,000
A-2 (Best Bus)	2,680	706,000	6,720	1,754,000
A-2 (Best Bus Modified) [1]	2,950	713,000	7,390	1,771,500
Trolley B	4,660	1,202,900	8,190	2,116,200
Trolley C	1,630	442,700	4,770	1,304,700
Trolley D	4,620	1,165,600	7,550	1,951,600
Trolley E	4,310	1,114,700	7,720	1,996,400

[1] Updated on 11/95

Exhibit 4: Estimated Operating/Maintenance Costs (in 1991 $)

Alternative	Operating and Maintenance Costs	
	1995	2010
A-1 (TSM)	$913,000	$1,007,000
A-2 (Best Bus)	$939,000	$1,210,000
A-2 (Best Bus Modified) [1]	$1,032,900	$1,333,000
Trolley B	$1,830,000	$2,065,000
Trolley C	$1,589,000	$1,601,000
Trolley D	$1,834,000	$2,069,000
Trolley E	$1,812,000	$2,044,000

[1] In 1993 Dollars

Exhibit 5: Estimated Capital Costs (in 1991 $)

Description	A-1 TSM	Best Bus, Best Bus Modified	Fixed Guideway Trolley			
			B	C	D	E
Guideway Elements	$0	$4,014,000	$10,876,000	$7,828,000	$10,900,000	$10,453,000
Systems	$60,000	$1,250,000	$2,245,000	$1,934,000	$2,196,000	$2,170,000
Stations/Vehicles	$1,840,000	$3,440,000	$9,960,000	$8,300,000	$9,880,000	$9,880,000
Special Costs	$0	$4,761,000	$7,211,000	$10,155,000	$7,208,000	$8,395,000
Engineering/Design/Construction Management	$475,000	$3,366,000	$7,573,000	$7,054,000	$7,546,000	$7,725,000
Contingencies	$570,000	$4,040,000	$9,088,000	$8,465,000	$9,055,000	$9,269,000
Total	$2,945,000	$20,871,000	$46,953,000	$43,736,000	$46,785,000	$47,892,000

Rationale for Selecting The Locally Preferred Alternative

The central goal of the City of Orlando was to select and invest in the alternative that achieved the strategy set out in the Growth Management Plan: to rely on a transit and pedestrian system for the downtown internal circulation. Based on the adopted goals in the Growth Management Plan, the City of Orlando considered the No-build Alternative unacceptable. Of the two rubber-tired alternatives (TSM and Best Bus), only the Best Bus Alternative met the minimum evaluation criteria. Since the Best Bus Alternative operates within exclusive bus-only lanes the selection committee felt that this alternative would provide a more efficient and reliable downtown circulator. Also, the committee felt that the extensive capital investment in the bus-only lanes would create long-term economic benefits for the downtown.

Of the four fixed guideway alternatives, Alternative B was the best-performing alternative. Trolley B produced the highest ridership forecasts of all of the guideway alternatives and had minimal impacts on future traffic operations and the environment.

The selection of the locally preferred alternative came down to a choice between the Best Bus Alternative and Guideway Trolley Alternative B. The Orlando City Council believed that the two options would both achieve the goals for the project. Based on a host of factors including capital and operating/maintenance costs, the Best Bus Alternative was selected as the locally preferred alternative. The City felt that this alternative would play an important part in its long-term strategy of shifting future automobile trips to public transit and walking.

Operational Performance

In order to perform an operational analysis of the LYMMO, CUTR performed a "ridecheck" of all trips for each service block (group of trips/runs) during an entire day of LYMMO service. The ridecheck consisted of placing an individual on board each LYMMO vehicle to count the number of customers that board and alight at each stop/station along the 3.0 mile route loop as well as collecting other operational data such as noting vehicle bunching.

The section is organized into three parts:

- Existing service characteristics
- Service analysis

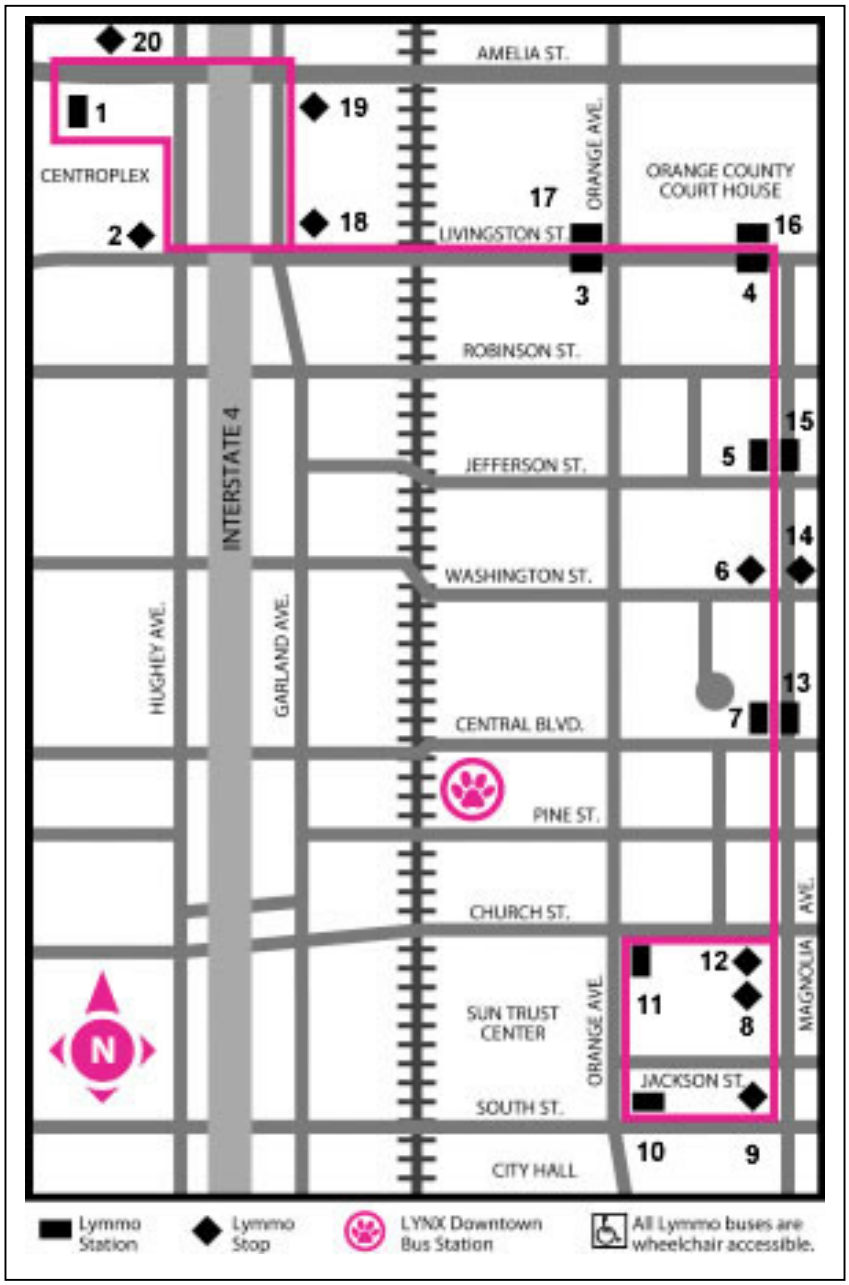
Existing Service Characteristics

In this section, service provided by each block is summarized by stop and station. Also included in this section is a ranking of performance of the block in relation to other blocks. This ranking is compiled by using the performance measures passengers per in-service mile and passengers per in-service hour. These measures are combined to create a composite score for each block and then ranked from the top performer (#1) to lowest performer (#16).

Service Analysis

This section includes an analysis of daily customer boardings and alightings that were derived from the ridecheck. Using Geographic Information Systems (GIS) and the number of customer boardings and alightings, load factors (number of customers on board vehicles for entire block) were calculated and plotted by stop and station for each service block. Exhibit 6 provides a numbered stop and station key for use when examining the load factor information.

Exhibit 6: LYMMO Stop and Station Key



All Blocks (System Summary)

Existing Service Characteristics

Currently, the LYMMO operates from 5:50 AM to 10:31 PM and consists of 186 total round trips.

Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for all blocks. The ridecheck data show that there were 3,986 total boardings and alightings. The ridecheck data show that most boardings and alightings occurred at the Centroplex Garage with 1,193 and 892, respectively. Exhibit 7 shows the boardings and alightings by stop and station for all blocks. Using the ridecheck data, the following measures were computed for all blocks: passengers per in-service hour, passengers per in-service mile, average number of passengers per in-service hour, and average number of passengers per in-service mile. The ridecheck data reveal that the average number of passengers per in-service hour is 41.5 and the average number of passengers per in-service mile is 4.8, as shown by the red lines in Exhibits 8 and 9. According to the observations made by ridecheckers, bunching was not a major problem during the time data were gathered.

Exhibit 7: Customer Boardings and Alightings for LYMMO All Blocks

Stop and Station Number	All Blocks		
	Boardings	Alightings	Load
1 (Start)	1193	0	1193
2	64	6	1251
3	79	199	1131
4	414	559	986
5	156	162	980
6	34	99	915
7	110	554	471
8	21	95	397
9	65	57	405
10	68	105	368
11	150	156	362
12	112	12	462
13	468	89	841
14	50	17	874
15	109	111	872
16	640	377	1135
17	113	64	1184
18	8	11	1181
19	5	20	1166
20	10	284	892
21 (End)	0	892	0
Totals	3869	3869	0

Exhibit 8: Number of and Average Passengers per In-Service Hour by Block

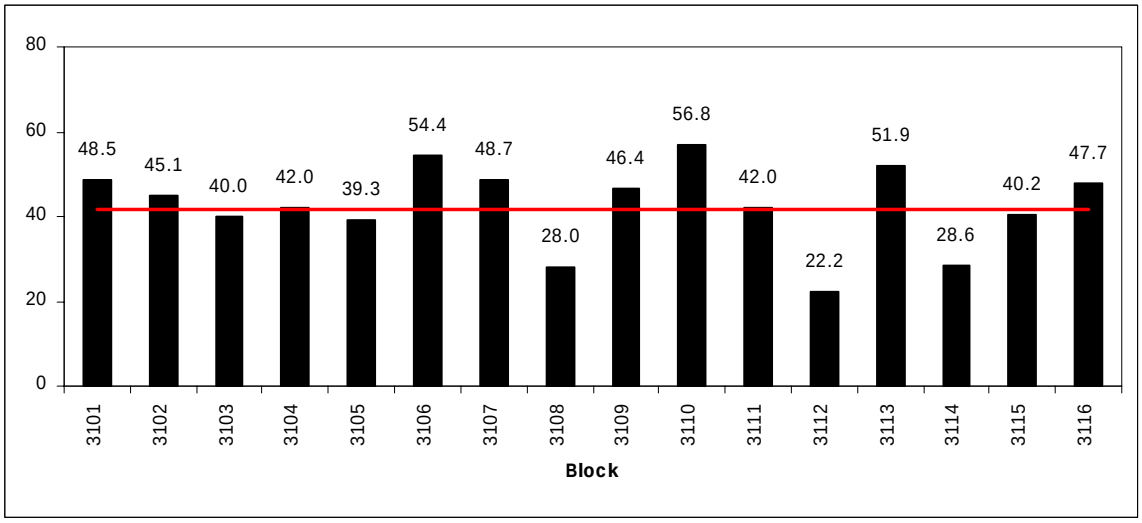
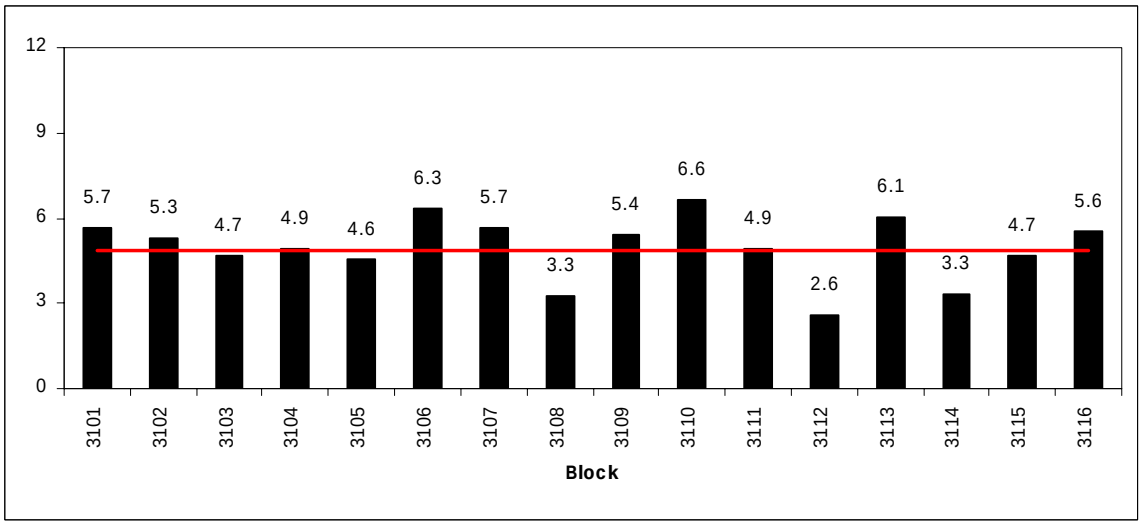


Exhibit 9: Number of and Average Passengers per In-Service Mile by Block



Composite Scores

Recent trends in the industry prescribe that transit systems and modes within these systems must become more competitive in the provision of services. As part of this effort, a performance monitoring process is necessary to determine whether services are in fact serving the needs and customers for whom they are intended. Although recommendations of the evaluation are designed to bring about improvements to the LYMMO system, it is always prudent to have ongoing performance monitoring.

For the LYMMO, a performance-monitoring program may utilize objective measures related to trip, block, or system level performance (i.e., efficiency, effectiveness). For example, a performance goal for a particular block may be that it performs at five (5) passengers per in-service mile of operation or slightly above the LYMMO's average number of passengers per in-service mile.

Using data gathered from the ridecheck, Exhibit 10 shows block-by-block performance. As shown in Exhibit 10, Block 3110 is the LYMMO's top performer for both passengers per in-service hour and mile and Block 3112 is the LYMMO's poorest performer for both measures.

Exhibit 10: Block-by-Block Performance with Composite Scores

Block	Composite Score	Passengers per In-Service Hour	Passengers per In-Service Mile
3110	1	56.84	6.63
3106	2	54.36	6.34
3113	3	51.89	6.05
3107	4	48.72	5.68
3101	5	48.53	5.66
3116	6	47.69	5.56
3109	7	46.40	5.41
3102	8	45.12	5.26
3104	9	42.03	4.90
3111	10	42.02	4.90
3115	11	40.22	4.69
3103	12	39.96	4.66
3105	13	39.25	4.58
3114	14	28.57	3.33
3108	15	28.03	3.27
3112	16	22.20	2.59
Average	-	42.61	4.96

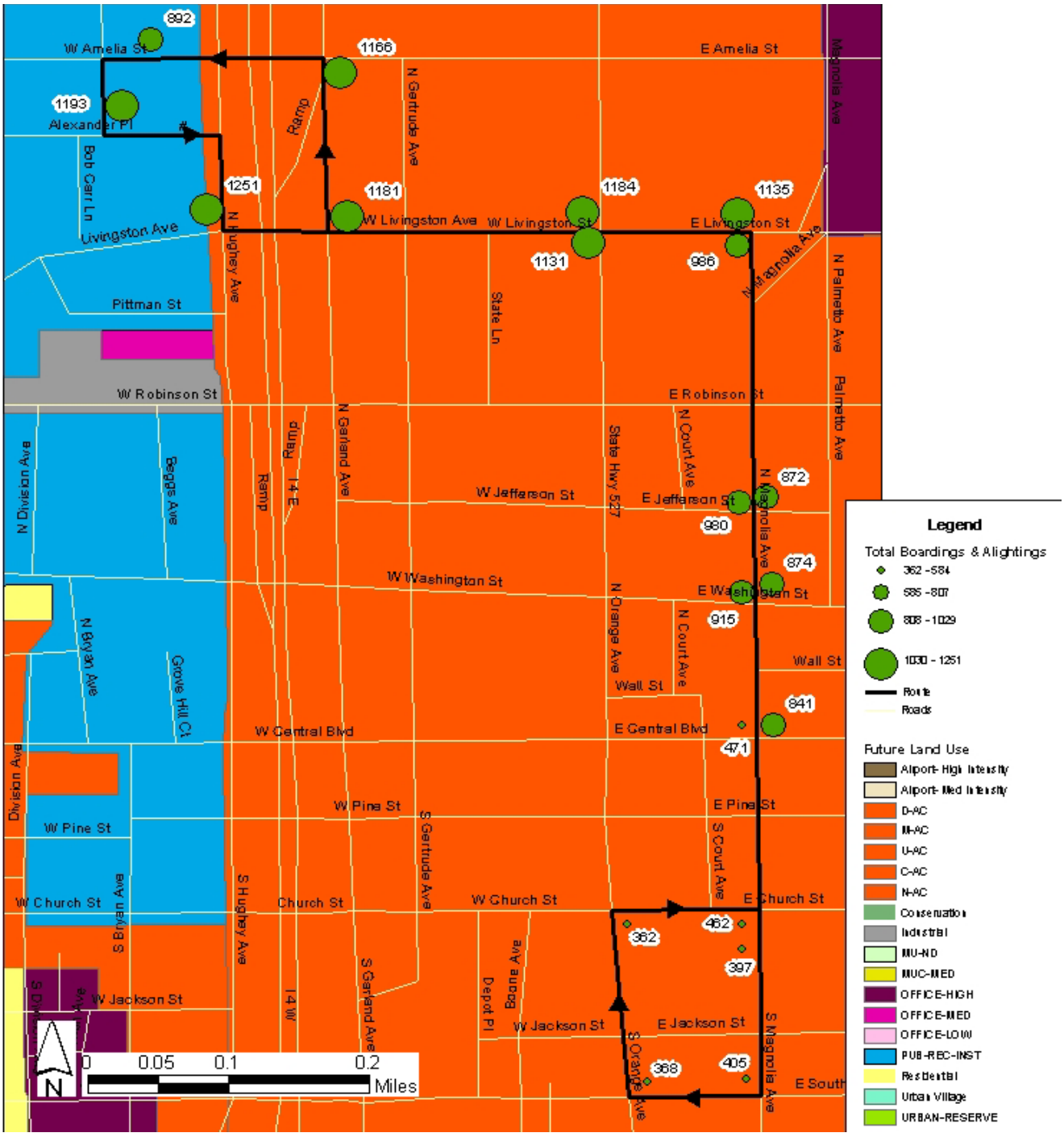
Using the data gathered from the ridecheck, Exhibit 11 shows a time-of-day (AM vs. PM) analysis by station/stop. As shown in Exhibit 11, for all AM blocks, the CentroPlex Garage (Station 1) had the most boardings and the Courthouse station (Station 4) had the most alightings. For the PM, the Courthouse had the most boardings (Station 16) and the CentroPlex Garage (Station 1) had the most alightings.

Exhibit 12 illustrates the number of boardings and alightings by station gathered from the ridecheck. The exhibit also shows associated future land-uses.

Exhibit 11: Time of Day Analysis

AM Blocks (all blocks starting before noon)			
Stop and Station Number	**Boardings**	**Alightings**	**Load**
1 (Start)	1007	0	1007
2	60	5	1062
3	65	194	933
4	315	546	702
5	111	149	664
6	19	69	614
7	83	367	330
8	11	78	263
9	47	32	278
10	55	77	256
11	107	106	257
12	91	6	342
13	297	67	572
14	43	15	600
15	76	95	581
16	199	301	479
17	52	52	479
18	6	8	477
19	5	12	470
20	6	146	330
21 (End)	0	330	0
Totals	2655	2655	0
PM Blocks (all blocks starting after noon)			
Stop and Station Number	**Boardings**	**Alightings**	**Load**
1 (Start)	186	0	186
2	4	1	189
3	14	5	198
4	99	13	284
5	45	13	316
6	15	30	301
7	27	187	141
8	10	17	134
9	18	25	127
10	13	28	112
11	43	50	105
12	21	6	120
13	171	22	269
14	7	2	274
15	33	16	291
16	441	76	656
17	61	12	705
18	2	3	704
19	0	8	696
20	4	138	562
21 (End)	0	562	0
Totals	1214	1214	0

Exhibit 12: Boardings and Alightings by Station/Stop with Future Land Uses



Technology Assessment

Based on an examination of the information gathered as part of Technical Memorandums One and Two, an assessment of the effectiveness of the various technologies applied to the LYMMO was conducted. Where applicable, the Advanced Public Transit Systems (APTS) evaluation guidelines developed by the FTA were used as guidance in conducting the assessment. An objective of these guidelines is to foster consistency of evaluation philosophy and techniques, and comparability and transferability of results to improve the quality and utility of information obtained from the APTS program. The guidelines are designed to emphasize the assessment of the APTS Program's national objectives as well as the objectives of the local implementing agency.

Exhibit 13 shows the APTS technologies that are currently in use as part of the LYMMO BRT system.

Exhibit 13: Lynx LYMMO APTS Technologies

APTS Technology	
Wireless Passenger Advisory System (PAS) / Automated Vehicle Location (AVL)	
Passenger Information	Information Display Terminals (Transit TV Network)
	Customer Information Kiosks (at stations)
LYMMO Bus Signal Phasing	

Note: The APTS technologies listed above are described in detail in Technical Memorandum One.

The objectives of the FTA's BRT Demonstration Program are as follows:

- Improve bus speeds and schedule adherence;
- Increase ridership as a result of improved bus speeds, schedule adherence, and convenience;
- Minimize the effect of brt on other traffic;
- Isolate the effect of each brt feature on bus speed and other traffic; and
- Assess the effect of brt on land use and development.

With regard to APTS technologies and other BRT features, Lynx LYMMO results related to FTA's Demonstration Program objectives are as follows:

<u>Objective 1: Improve bus speeds and schedule adherence</u>

- LYMMO bus speeds have not improved compared to the *FreeBee* as a result of the use of the various APTS technologies used as part of the system. Currently, the

LYMMO's average weekday speed is approximately 9.0 miles per hour vs. 9.9 miles per hour for the *FreeBee* (LYMMO average speed was calculated by dividing the 3.0 route miles by a 20 minute round time). However, without the use of the various APTS technologies the LYMMO would be considerably slower than its current average speed of 9.0 miles per hour due to increased ridership (more dwell time at stations and stops), increased number of stations/stops, and having to stop at every station regardless of whether a customer has signaled the bus to stop or not compared to the *FreeBee*.

- Results from the on-board survey conducted as part of this evaluation show that LYMMO schedule adherence (reduced LYMMO vehicle bunching) has improved as a result of the PAS/AVL system. LYMMO staff is able to monitor the precise location of vehicles to reduce bunching and better respond to on-street demand.
- The LYMMO's exclusive bus-only right-of-way contributes to the customer's "perception" of improved bus speeds (reduction in travel time).

Objective 2: Increased ridership as a result of improved bus speeds, schedule adherence, and convenience

- LYMMO ridership has remained steady at about 5,000 average weekday riders despite not improving bus speeds. According to the City of Orlando, average vehicle occupancy in the Downtown is 1.2 persons per vehicle. The average weekday ridership of 5,000 LYMMO person trips would convert to 4,166 daily vehicle trips, which is daily traffic presumably reduced by the LYMMO.
- LYMMO vehicles operate using a demand-based headway schedule with very frequent service (short time between buses). Since the implementation of the Passenger Advisory System (PAS), Lynx has been able to monitor the position of LYMMO buses in real-time to eliminate bunching as much as possible and respond to increased demand.
- Ridership has remained steady due to the convenience of the LYMMO in the downtown core. The LYMMO provides an excellent alternative to trips made in the downtown core by private automobile and even walking. The LYMMO route either directly serves or is in very close proximity to many of the major destinations in the downtown core including government facilities, banks, and restaurants. The LYMMO meets this objective by providing downtown employees and visitors with a unique transit service that they can be used for daily internal downtown trips.

Objective 3: Minimize the effect of BRT on other traffic

- As noted above in Objective 2, LYMMO ridership has remained steady at about 5,000 average weekday riders. According to the City of Orlando, average vehicle occupancy in Downtown Orlando is 1.2 persons per vehicle. The average weekday ridership of 5,000 LYMMO person trips would convert to 4,166 daily vehicle trips, which is daily traffic presumably reduced by the LYMMO. Given this, the LYMMO has had a positive effect on other traffic by removing almost 4,200 daily vehicle trips from Downtown Orlando.
- The exclusive bus-only right-of-way and bus signal phasing APTS system have minimized the effect of the LYMMO on cross-street traffic and other general vehicular traffic in the downtown core. According to the City of Orlando, this is partially due to good traffic signal timing and traffic being evenly distributed over the Downtown's gridded street network.

Objective 4: Isolate the effect of each BRT feature on bus speed and other traffic

- Despite exclusive bus-only lanes and signal pre-emption (APTS system), average speeds are somewhat lower for the LYMMO than its predecessor the *FreeBee*. One possible explanation is that LYMMO buses stop at each station, whether a customer has signaled the bus to stop or not. Another possibility is that the increase in ridership between the *FreeBee* and LYMMO has resulted in more dwell time while customers are boarding, despite the low floor vehicles and the absence of fare collection time and shorter route compared to the *FreeBee*.
- The PSA/AVL APTS system used as part of the LYMMO has had a positive effect on station dwell time since Lynx operations is able to use it to adjust LYMMO bus spacing to more evenly distribute headways.
- The new APTS information kiosks located at stations provide information to waiting customers via the PSA/AVL system about next bus arrival and the actual location of buses along the entire LYMMO route, thus reducing customer anxiety associated with waiting for the bus. In addition, the Transit TV Network terminals located inside every LYMMO bus provide customers with real-time information about the LYMMO and other items such as current events in the Downtown, weather, and local news.

Objective 5: Assess the effect of BRT on land use and development.

- Downtown Orlando has experienced significant population and employment growth, due in part to the implementation and presence of the LYMMO. As development in

urban areas intensifies, vehicular traffic congestion will naturally occur. While the goal of reducing congestion may have been stated in the LYMMO planning documentation, the City's emphasis has been progressively clarified to provide convenient and reliable transportation choices while responsibly accommodating growth demands.

Project Effectiveness

The Lynx LYMMO project has been successful at meeting all six of its original goals and objectives.

Goal 1: Reduce congestion (i.e., vehicular trips) in downtown core.

- reduce the vehicular trips by people already in downtown,
- relieve vehicular traffic congestion in downtown area, and
- reduce traffic and parking volumes in downtown core.

Total average 2001 weekday ridership for the LYMMO is 5,000 passengers per day. According to the City of Orlando, average vehicle occupancy is 1.2 persons per vehicle. The 5,000 LYMMO person trips would convert to 4,166 daily vehicle trips, which is daily traffic presumably reduced by the LYMMO. However, downtown Orlando offers a pleasant walking environment and undoubtedly, a portion of those trips would have been walking trips had riders not had the choice of riding LYMMO.

Downtown Orlando has experienced significant population and employment growth which is desirable in an economically healthy urban area. As development in urban areas intensifies, vehicular traffic congestion is expected to occur. While the goal of reducing congestion may have been stated in the LYMMO planning documentation, the City's emphasis has been progressively clarified to provide convenient and reliable transportation choices while responsibly accommodating growth demands. The LYMMO system meets this goal by providing downtown employees and visitors with a unique transit service that they can use daily for internal downtown trips.

Goal 2: Lessen demand for parking in downtown core

- lessen demand for downtown parking,
- help downtowners and out-of-town visitors park their cars once and then get around Downtown Orlando by transit or as pedestrians for other daily trips, and

- encourage downtowners to park their vehicles, then become pedestrians and transit users.

According to the on-board survey conducted as part of this evaluation, 51.5 percent of the LYMMO trips were work trips. One can assume that a portion of the downtown employees making those trips used parking outside the downtown core (e.g. Centroplex). The same could be said for other trip purposes such as Jury Duty (8.7%), events at Bob Carr (0.2%), and events at the Arena (1.6%). The percentage of these trip purposes, which presumably could have used parking outside the downtown core add up to 62 percent, or 2,583 daily vehicle trips. One can further assume that the daily demand for downtown core parking was reduced by up to 2,583 spaces.

Goal 3: Encourage more transit use and pedestrians in downtown

- get people who have never used transit to step on a bus, and
- provide convenient mode of travel for special purpose trips in downtown (e.g., lunch, shopping, jury duty, and personal business).

The on-board survey conducted as part of this evaluation shows that 7.6 percent of riders (380 persons) were first time riders including tourists. Further, the survey shows that riders use LYMMO for a variety of special purpose trips such as lunch/shop/errands (17.4 percent or 870 persons), Jury Duty (8.7 percent or 435 persons), events at Bob Carr (0.2 percent or 10 persons), and events at the Arena (1.6 percent or 80 persons). Other special purpose trips include Church Street, the Library, Lake Eola, and Downtown banks (20.6 percent or 1,030 persons – including jury duty). The survey shows the remaining 51.5 percent as work trips, which are not part of the special purpose trips evaluated in this goal. Using the on-board survey as reference, a daily average of 2,425 persons elect to use the LYMMO to conduct special purpose trips in the Downtown core.

Goal 4: Increase mobility and accessibility to major downtown destinations

- provide service to downtown employees,
- enhance the accessibility of Downtown Orlando's major destinations (e.g., Centroplex, Arena, Courthouse, Post Office, Library, Lake Eola, City Hall, Church Street, etc.),
- become the "horizontal" elevator to all major downtown destinations,
- connect major developments in the north and south ends of downtown,
- distribute downtown workers from remote parking sites to their workplaces,
- increase downtown mobility,

- improve accessibility, and
- link parking facilities to major downtown employment centers, government agencies, and entertainment areas decreasing the need for private vehicles in the downtown core.

The LYMMO achieves this goal daily by providing service to the 5,000 average daily riders that elect to use the system. The LYMMO route connects the major downtown destinations to include parking facilities, government agencies, and entertainment areas in the north and south ends of downtown.

Goal 5: Enhance quality and public perception of Downtown Orlando

- improve public perception in Downtown Orlando, and
- enhance quality of the downtown environment.

The City of Orlando and the Downtown Development Board have for many years implemented significant physical improvements aimed at enhancing the quality of the Downtown environment. The implementation of the LYMMO included not only the provision of a high-quality transit service but also a major program of physical improvements such as streetscaping, landscaping, beautification, and safety. These improvements were successful in providing an attractive and effective transit system as well as enhancing the physical appearance and image of the overall Downtown Orlando area.

Goal 6: Allow for additional downtown development capacity

- meet State's stipulation (i.e., providing transit) for additional development capacity downtown,
- enhance downtown growth through reducing individual trips,
- allow for the development of additional building space, and
- increase commercial business along route.

In 1998, the City of Orlando adopted a Transportation Concurrency Exception Area (TCEA) as part of the adoption of the Transportation Element of the Growth Management Plan. The purpose of the State's TCEA provisions was to identify areas with a lower demand for vehicle trips and roadway capacity, combined with higher transit use, and therefore could be allowed to develop at a higher rate than those areas not meeting these provisions. The existing LYMMO service was considered in the designation of the City's TCEA since it provides Downtown employees and visitors with a high quality, frequent, and reliable transit system. As a result of

the LYMMO service, increased financial commitment via commercial businesses as well as residential development has occurred.

Transferability of Results and Recommendations

The BRT components that contributed to the success of the LYMMO and are most likely to succeed in other localities are bulleted below. In addition, the LYMMO's key BRT attributes (based on FTA documents of review of other BRT systems) are shown in Exhibit 14.

- Simple route structure
- Frequent service
- Headway-based schedule
- Less frequent stops (although more than *FreeBee*)
- Level customer boarding and alighting
- Public art vehicles
- Bus-only signal phasing
- Exclusive bus-only lanes/right-of-way
- High-capacity buses
- Multiple door boarding and alighting
- Coordinated land-use planning
- No fare to ride
- Enhanced bus stations
- Clean fuel vehicles (CNG)
- Low-floor vehicles
- Passenger Advisory System/Automated Vehicle Location
- Transit TV Network
- Passenger information kiosks at stations
- Arrival time of next bus
- Extensive street-scaping and beautification of route
- Peripheral parking
- Marketing and promotional materials
- Community involvement in planning and development

Exhibit 14: Key Bus Rapid Transit Elements of the LYMMO

Key BRT Attributes	LYMMO	
	Yes	No
Simple Route Structure	Y	
Frequent Service	Y	
Headway-based Schedules	Y	
Less Frequent Stops	Y	
Level Boarding and Alighting	Y	
Color-Coded Buses		Y
Color-Coded Stations/Stops	Y	
Bus Signal Priority	Y	
Exclusive Lanes	Y	
Higher-Capacity Buses		Y
Multiple Door Boarding and Alighting	Y	
Off-Vehicle Fare Payment	NA	
Feeder Network		Y
ITS/APTS	Y	
Coordinated Land Use Planning	Y	

In summary, the LYMMO has had considerable success. But to avoid success being its undoing, system partners need to continue working together to better manage service, improve the consistency of the service, and look for ways to improve the customers' overall riding experience. Based on results from the three technical memorandums, a number of recommendations are provided for continual improvement to LYMMO service as follows:

- The City of Orlando and Lynx should continue to build upon the success of the LYMMO by working with other cities and municipalities in Lynx's tri-county service area to implement LYMMO-BRT type services where applicable.
- Given the current frequency levels and customer loads on the LYMMO, continue to offer same headway-based schedule at specified days and times and continue the use of smaller buses until demand dictates larger capacity buses.
- Continue to adjust scheduled frequencies using the PAS/AVL system to reflect current conditions (i.e., maintain even vehicle spacing and respond to unusually high customer demand). Even vehicle spacing is very important under most service conditions. However, during extreme conditions with headways under 5 minutes, the need to evenly space vehicles is unnecessary from a customer standpoint. The critical element during these conditions is to eliminate wide gaps in services and to provide adequate capacity so that there are no customer pass-bys.
- Explore ways to better connect the LYMMO to the rest of the Lynx system.
- Continue to promote the LYMMO as a viable transportation alternative that improves traffic congestion, air quality, and saves time through marketing information.

- Explore the use of new ITS/APTS technologies to improve the average speed of LYMMO vehicles such as the reimplementation/retiming of the traffic signal priority system while minimizing the impact on cross-street traffic.
- The DDB and City of Orlando should continue to use the LYMMO as a tool to build positive relationships with local businesses and other employers to attract additional work trip and lunchtime patrons.
- The City of Orlando, the DDB, and Lynx should work cooperatively to implement an east-west LYMMO line centrally located to the dowtown core business area. This service improvement should be implemented when the appropriate mix of land-uses, densities, and financial commitment are in place.
- The City of Orlando and Lynx should continue to seek customer input so that it can better understand their changing needs and can offer effective system improvements to meet needs.
- The City of Orlando and Lynx should continue to coordinate with the various jurisdictions to maintain an understanding of their vision for transit in their communities.

Data Availability

The most important aspect of a proper evaluation is the availability and reliability of data. While staff from Lynx, the City of Orlando, and the DDB was helpful in providing assistance and much of the data during the evaluation of the Lynx LYMMO BRT system, it became apparent during the evaluation process that historical and performance related data were not always available and, when available, were not in sufficient detail. This data "gap" caused many of the tasks of the LYMMO evaluation to be more subjective than objective in nature than originally scoped. While historical data were available related to the construction of the project, data were not systematically collected since service inception to be able to compare before and after performance characteristics of the previous downtown circulator (*FreeBee*) with the LYMMO BRT system. One valuable lesson learned from the LYMMO BRT evaluation is that as the FTA moves forward with funding for the planning, construction, and operation of BRT systems, specifically among the BRT Consortium members, the evaluation of the LYMMO BRT system has shown the critical need for data collection to begin immediately and systematically in order to allow for a detailed evaluation of the effectiveness of specific BRT components and the effectiveness of the overall BRT system.

Appendix A: Block-by-Block Ridecheck Data

Block 3101

Existing Service Characteristics

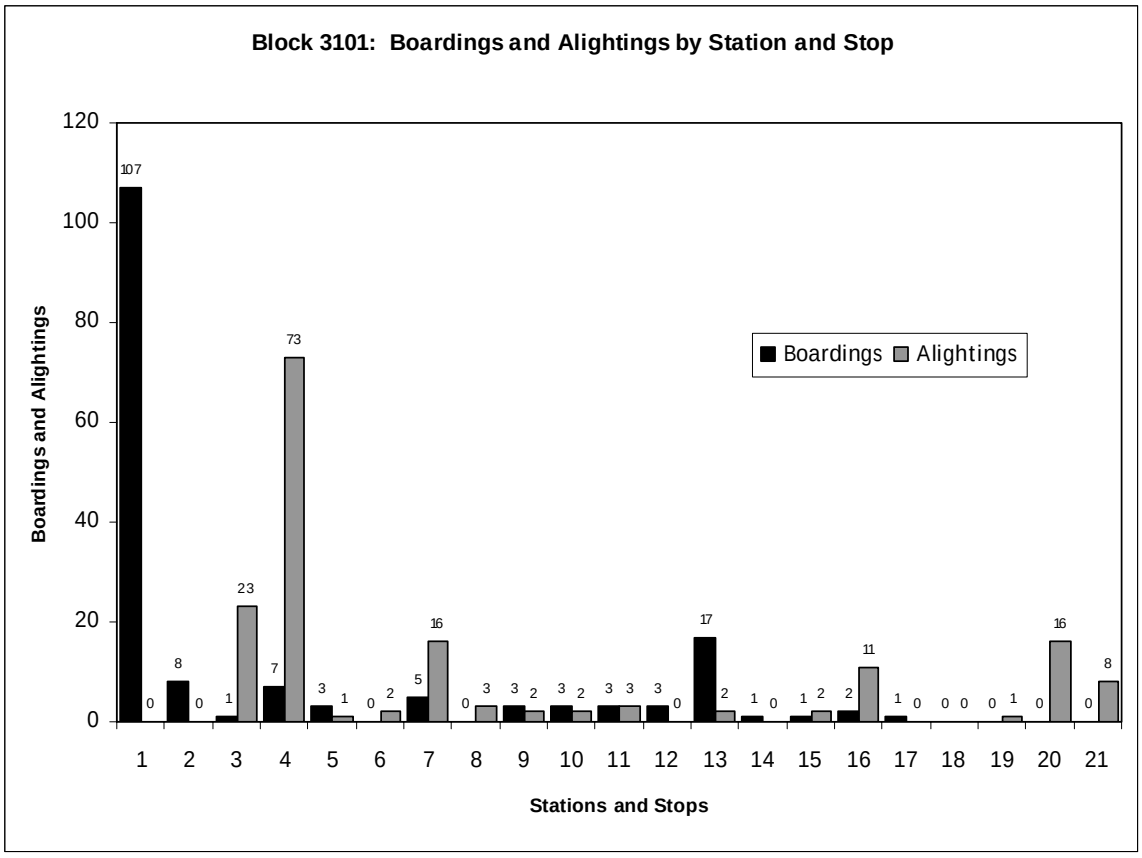
Block 3101 operates for 3 hours and 26 minutes from 5:50 AM to 9:26 AM and consists of 10 round trips. It serves the morning peak period.

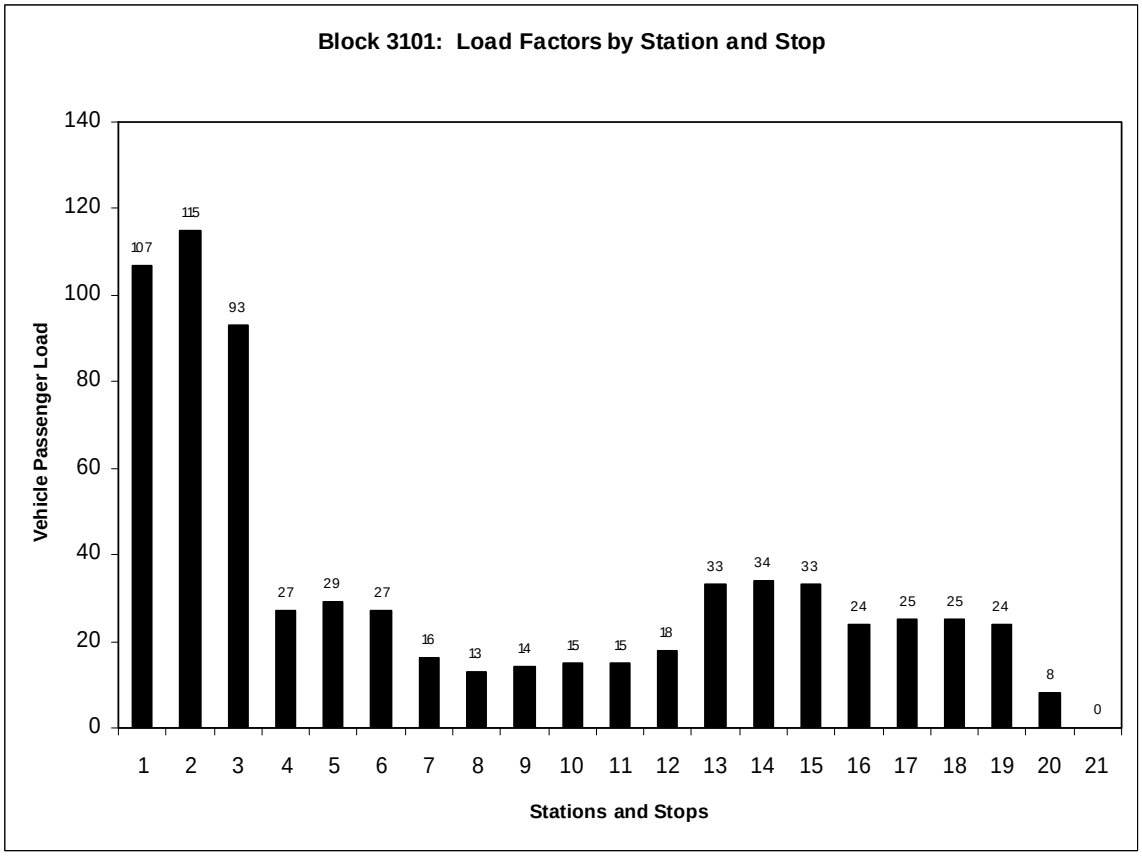
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station. The ridecheck data show that there were 165 total boardings and alightings for Block 3101. The ridecheck data show that most boardings occurred at the Centroplex Garage (107 boardings) and the Orlando Public Library (17 boardings) and the most alightings occurred at the Orange County Courthouse (73 alightings), the station at Livingston Avenue and Orange Avenue (23 alightings), and the station at Magnolia Avenue and Central Avenue (16 alightings), as shown in Exhibit 15. Using the ridecheck data, the following measures were computed: there are approximately 48.5 passengers per in-service hour and 5.7 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3101.

Exhibit 15: Customer Boardings and Alightings for LYMMO Block 3101

Stop and Station Number	Block 3101		
	Boardings	Alightings	Load
1 (Start)	107	0	107
2	8	0	115
3	1	23	93
4	7	73	27
5	3	1	29
6	0	2	27
7	5	16	16
8	0	3	13
9	3	2	14
10	3	2	15
11	3	3	15
12	3	0	18
13	17	2	33
14	1	0	34
15	1	2	33
16	2	11	24
17	1	0	25
18	0	0	25
19	0	1	24
20	0	16	8
21 (End)	0	8	0
Totals	165	165	0


Block 3101: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
107 0 8 0 1 23 7 73 3 1 0 2 5 16 0 3 3 2 3 2 3 3 3 0 17 2 1 0 1 2 2 11 1 0 0 0 0 1 0 16 0 8


Block 3101: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
107 115 93 27 29 27 16 13 14 15 15 18 33 34 33 24 25 25 24 8 0

Block 3102

Existing Service Characteristics

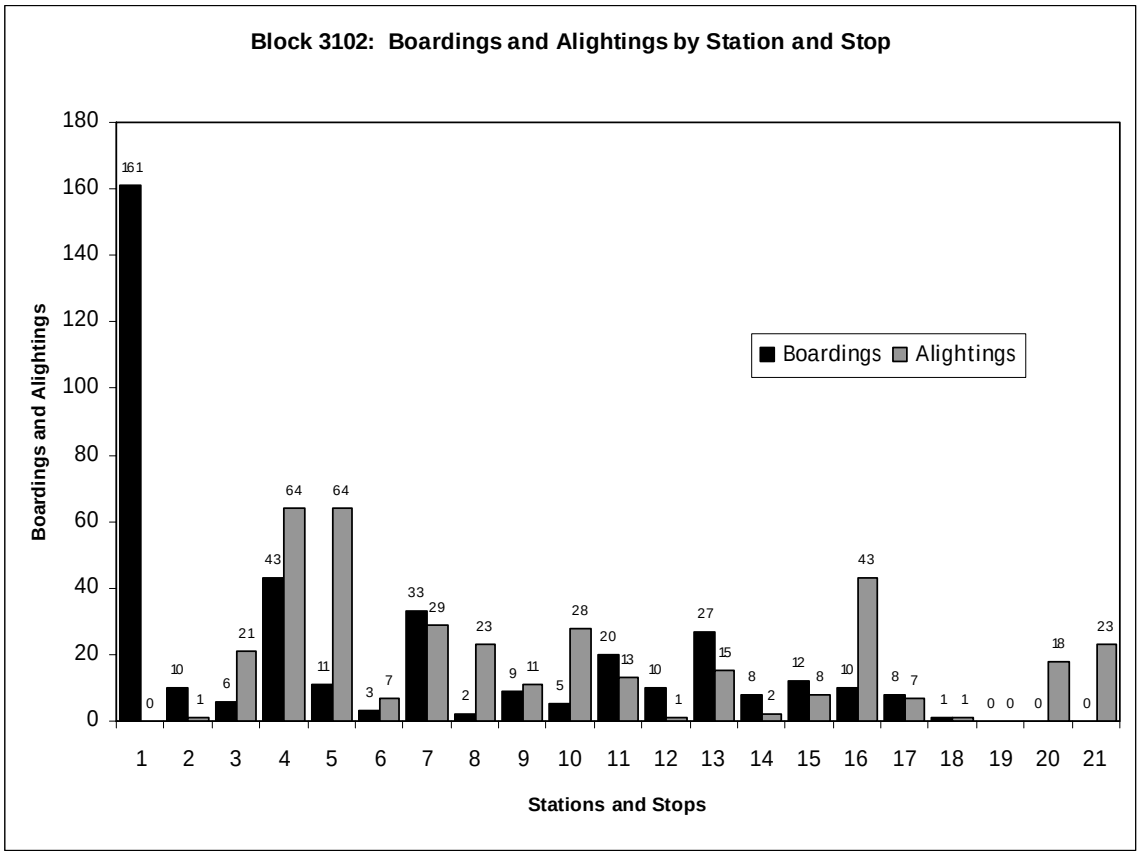
Block 3102 operates for 8 hours and 24 minutes from 6:00 AM to 2:24 PM and consists of 24 round trips. It serves both the morning and lunch peak periods.

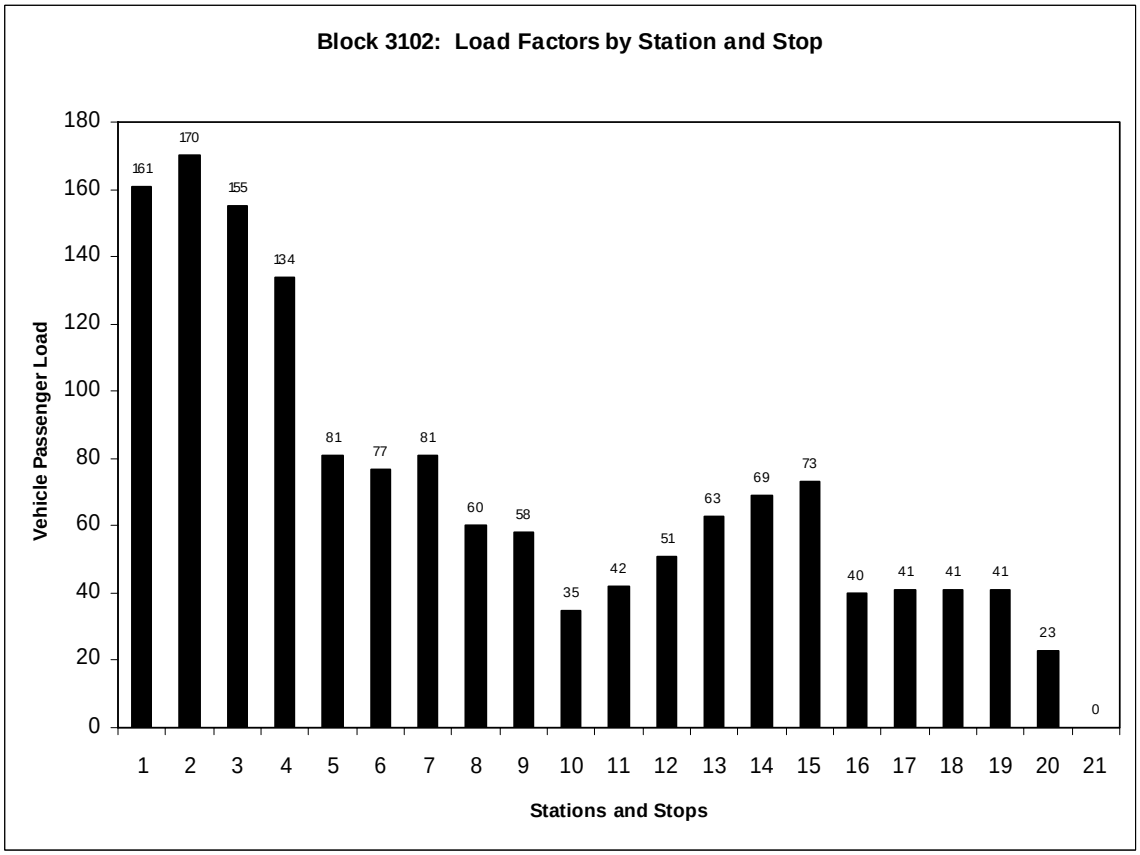
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3102. The ridecheck data show that there were 379 total boardings and alightings for Block 3102. The ridecheck data show that most boardings occurred at the Centroplex Garage (161 boardings) and the most alightings occurred at the Orange County Courthouse and Magnolia Avenue and Jefferson Avenue station (64 alightings each). Exhibit 16 shows the boardings and alightings by stop and station for Block 3102. Using the ridecheck data, the following measures were computed for Block 3102: there are approximately 45.1 passengers per in-service hour and 5.3 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3102.

Exhibit 16: Customer Boardings and Alightings for LYMMO Block 3102

Stop and Station Number	Block 3102		
	Boardings	Alightings	Load
1 (Start)	161	0	161
2	10	1	170
3	6	21	155
4	43	64	134
5	11	64	81
6	3	7	77
7	33	29	81
8	2	23	60
9	9	11	58
10	5	28	35
11	20	13	42
12	10	1	51
13	27	15	63
14	8	2	69
15	12	8	73
16	10	43	40
17	8	7	41
18	1	1	41
19	0	0	41
20	0	18	23
21 (End)	0	23	0
Totals	379	379	0


Block 3102: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
0 20 40 60 80 100 120 140 160 180
161 0
10 1
6 21
43 64
11 64
3 7
33 29
2 23
9 11
5 28
20 13
10 1
27 15
8 2
12 8
10 43
8 7
1 1
0 0
0 18
0 23


Block 3102: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
0 20 40 60 80 100 120 140 160 180
161
170
155
134
81
77
81
60
58
35
42
51
63
69
73
40
41
41
41
23
0

Block 3103

Existing Service Characteristics

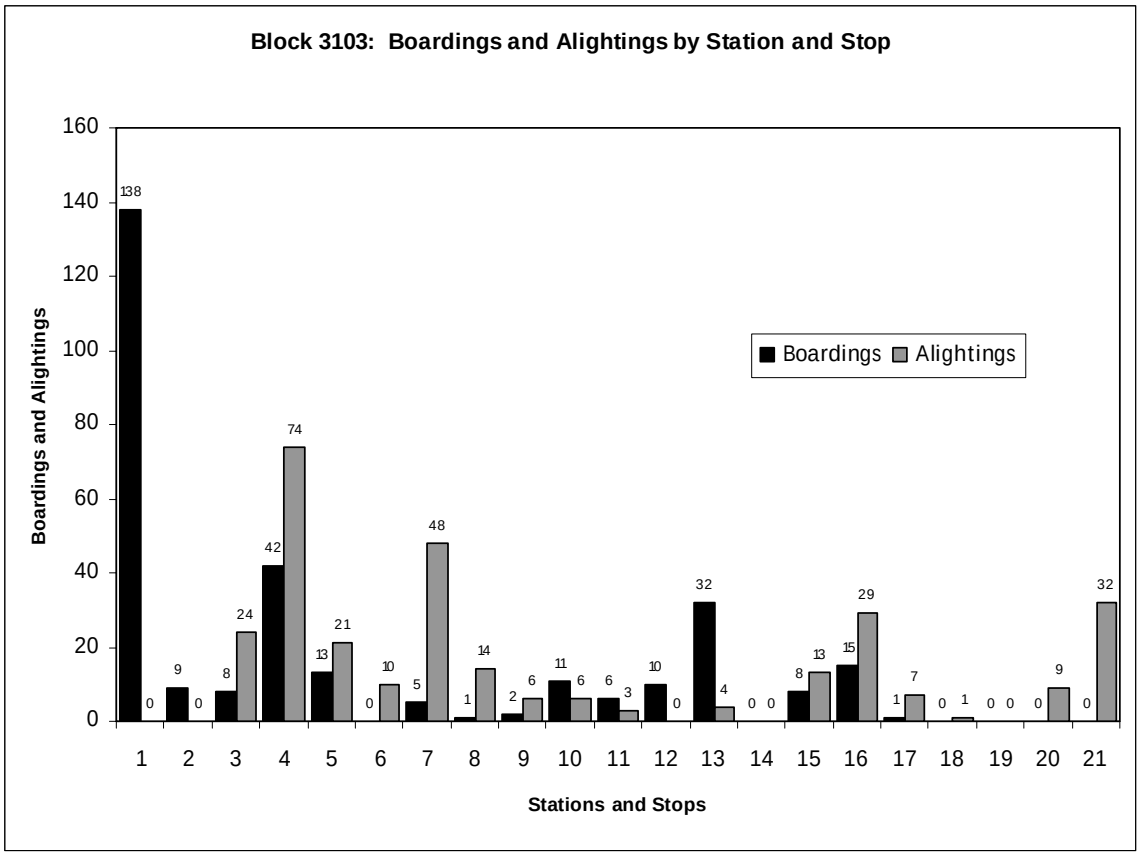
Block 3103 operates for 7 hours and 32 minutes from 6:10 AM to 1:42 PM and consists of 22 round trips. It serves both the morning and lunch peak periods.

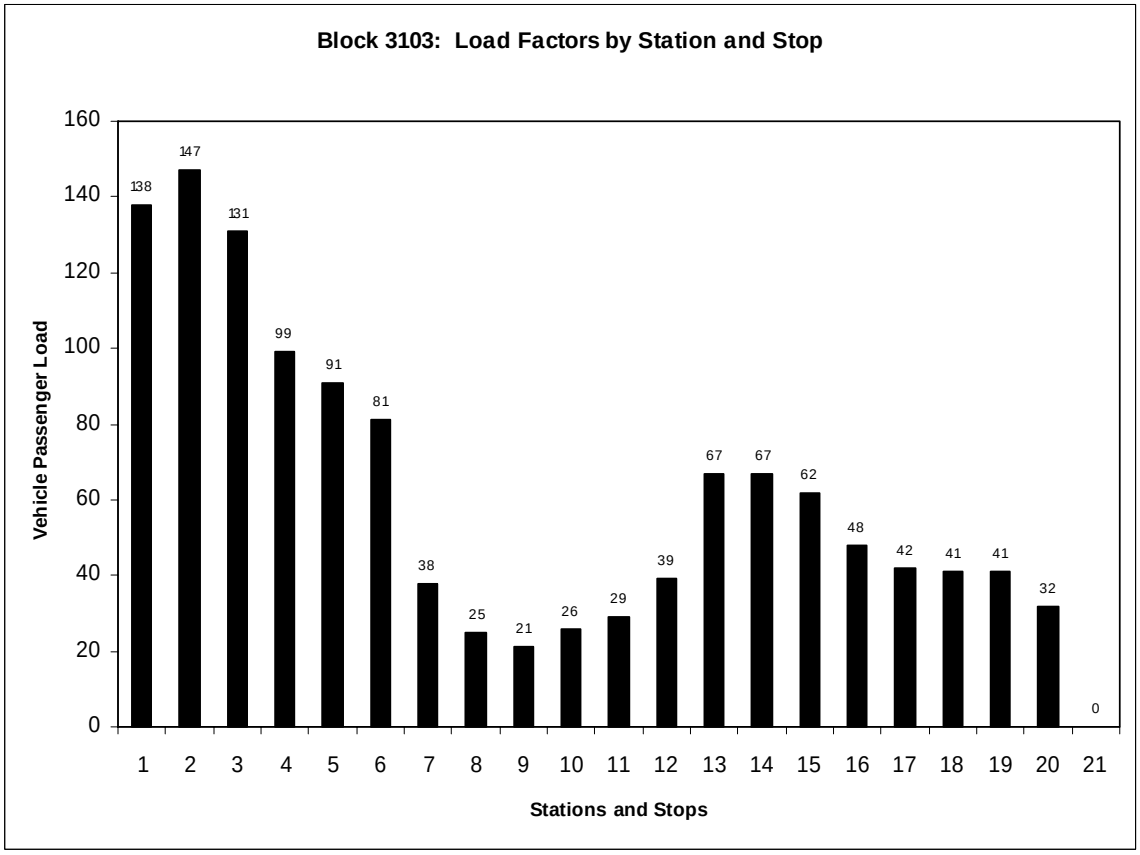
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3103. The ridecheck data show that there were 301 total boardings and alightings for Block 3102. The ridecheck data show that most boardings occurred at the Centroplex Garage with 138 and the most alightings occurred at the Orange County Courthouse with 74. Exhibit 17 shows the boardings and alightings by stop and station for Block 3102. Using the ridecheck data, the following measures were computed for Block 3103: there are approximately 40.0 passengers per in-service hour and 4.7 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3103.

Exhibit 17: Customer Boardings and Alightings for LYMMO Block 3103

Stop and Station Number	Block 3103		
	Boardings	Alightings	Load
1 (Start)	138	0	138
2	9	0	147
3	8	24	131
4	42	74	99
5	13	21	91
6	0	10	81
7	5	48	38
8	1	14	25
9	2	6	21
10	11	6	26
11	6	3	29
12	10	0	39
13	32	4	67
14	0	0	67
15	8	13	62
16	15	29	48
17	1	7	42
18	0	1	41
19	0	0	41
20	0	9	32
21 (End)	0	32	0
Totals	301	301	0


Block 3103: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
138 0 9 0 8 24 42 74 13 21 0 10 5 48 1 14 2 6 11 6 6 3 10 0 32 4 0 0 8 13 15 29 1 7 0 1 0 0 0 9 0 32


Block 3103: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
138 147 131 99 91 81 38 25 21 26 29 39 67 67 62 48 42 41 41 32 0

Block 3104

Existing Service Characteristics

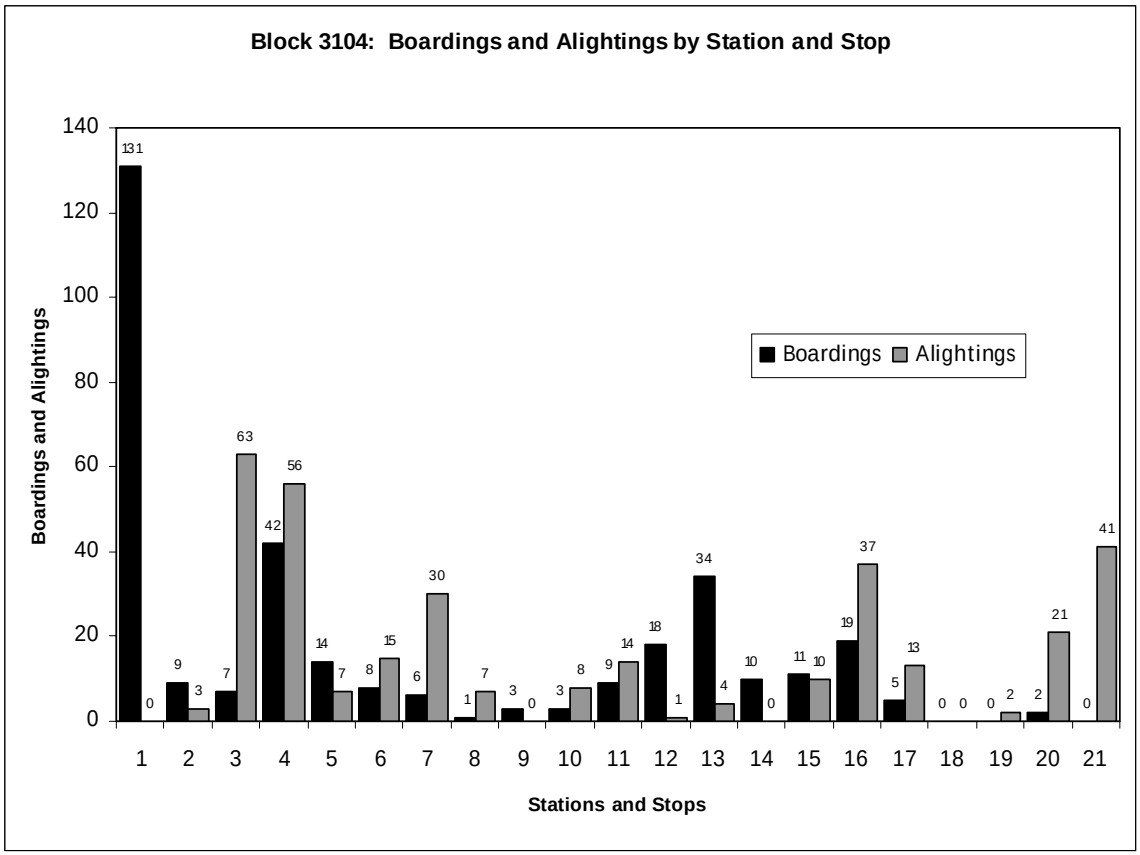
Block 3104 operates for 7 hours and 54 minutes from 6:25 AM to 2:19 PM and consists of 23 round trips. It serves both the morning and lunch peak periods.

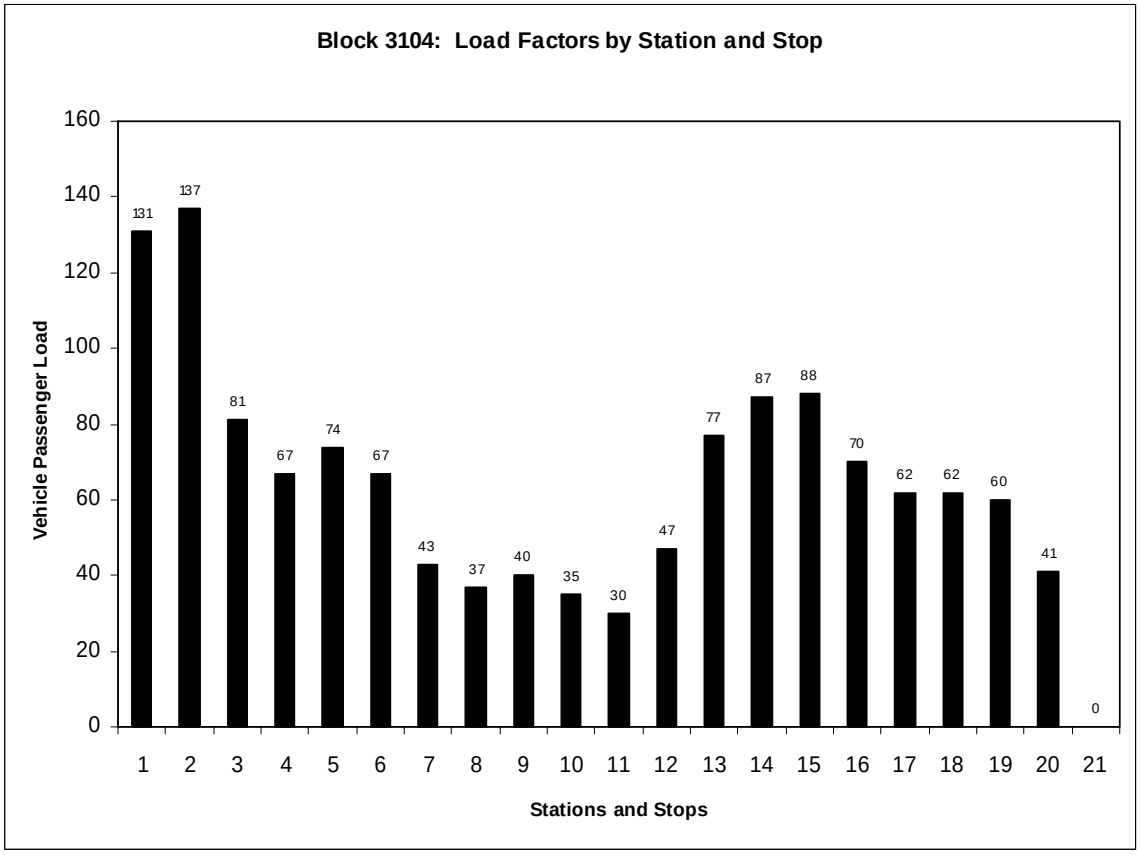
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3104. The ridecheck data show that there were 332 total boardings and alightings. The ridecheck data show that most boardings occurred at the Centroplex Garage with 131 and the most alightings occurred at the Livingstone Avenue and Orange Avenue station with 63. Exhibit 18 shows the boardings and alightings by stop and station for Block 3104. Using the ridecheck data, the following measures were computed for Block 3104: there are approximately 42.0 passengers per in-service hour and 4.9 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3104.

Exhibit 18: Customer Boardings and Alightings for LYMMO Block 3104

Stop and Station Number	Block 3104		
	Boardings	Alightings	Load
1 (Start)	131	0	131
2	9	3	137
3	7	63	81
4	42	56	67
5	14	7	74
6	8	15	67
7	6	30	43
8	1	7	37
9	3	0	40
10	3	8	35
11	9	14	30
12	18	1	47
13	34	4	77
14	10	0	87
15	11	10	88
16	19	37	70
17	5	13	62
18	0	0	62
19	0	2	60
20	2	21	41
21 (End)	0	41	0
Totals	332	332	0


Block 3104: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
0
20
40
60
80
100
120
140
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
131 0
9 3
7 63
42 56
14 7
8 15
6 30
1 7
3 0
3 8
9 14
18 1
34 4
10 0
11 10
19 37
5 13
0 0
0 2
2 21
0 41


Block 3104: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
0
20
40
60
80
100
120
140
160
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
131
137
81
67
74
67
43
37
40
35
30
47
77
87
88
70
62
62
60
41
0

Block 3105

Existing Service Characteristics

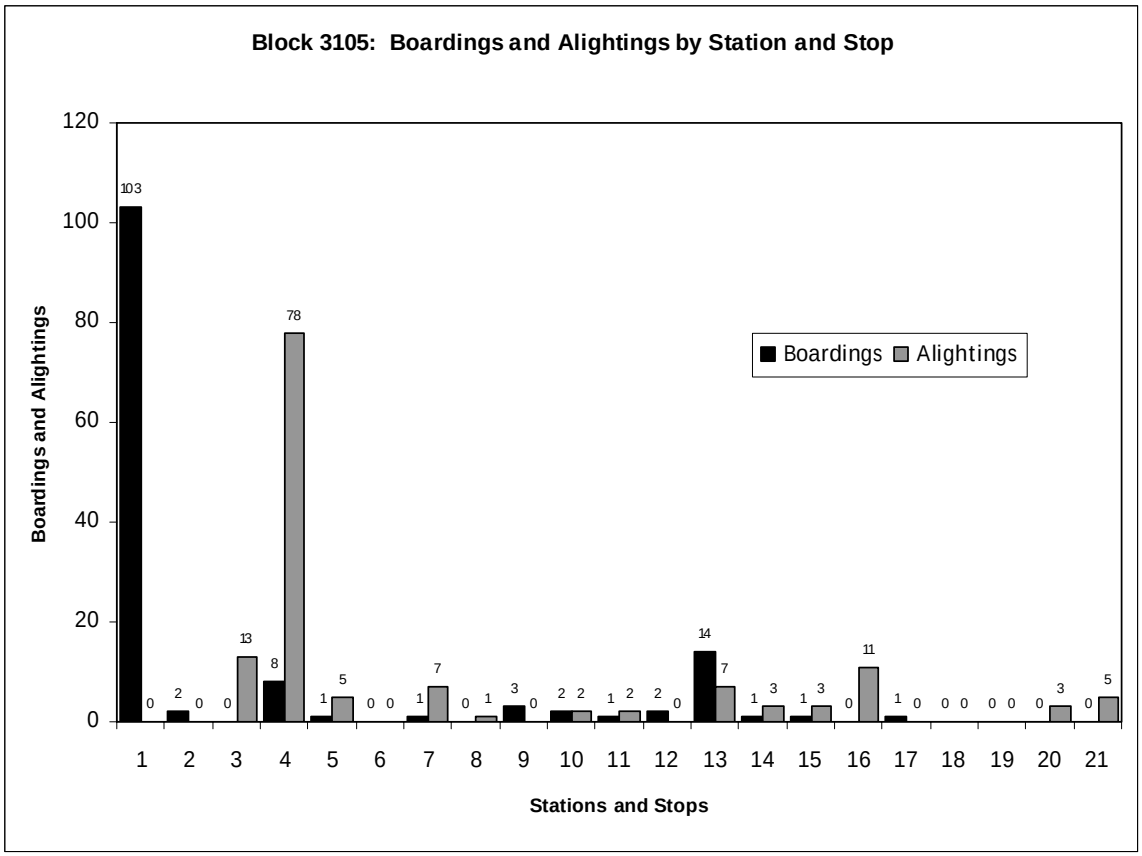
Block 3105 operates for 3 hours and 34 minutes from 6:35 AM to 10:09 AM and consists of 10 round trips. It serves the morning peak period.

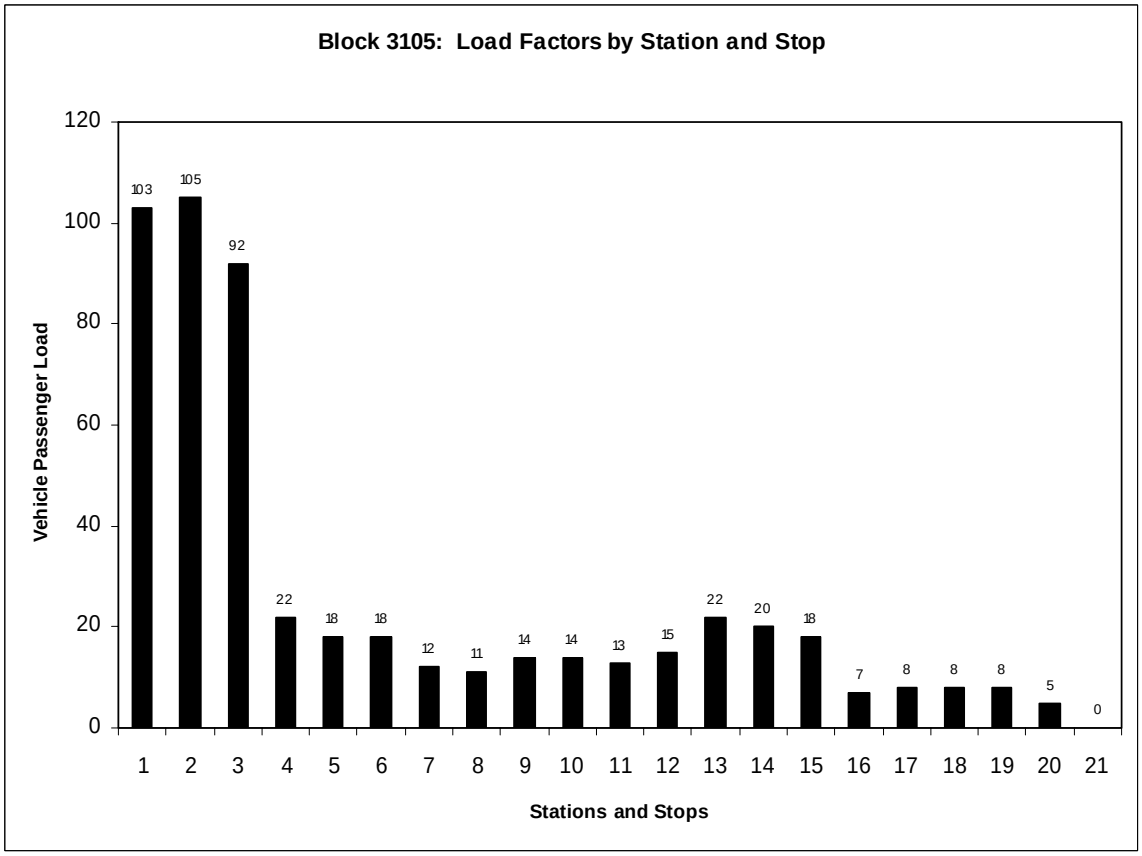
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3105. The ridecheck data show that there were 140 total boardings and alightings. The ridecheck data show that most boardings occurred at the Centroplex Garage with 103 and the most alightings occurred at the Orlando Public Library with 14. Exhibit 19 shows the boardings and alightings by stop and station for Block 3105. Using the ridecheck data, the following measures were computed for Block 3105: there are approximately 39.3 passengers per in-service hour and 4.6 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3105.

Exhibit 19: Customer Boardings and Alightings for LYMMO Block 3105

Stop and Station Number	Block 3105		
	Boardings	Alightings	Load
1 (Start)	103	0	103
2	2	0	105
3	0	13	92
4	8	78	22
5	1	5	18
6	0	0	18
7	1	7	12
8	0	1	11
9	3	0	14
10	2	2	14
11	1	2	13
12	2	0	15
13	14	7	22
14	1	3	20
15	1	3	18
16	0	11	7
17	1	0	8
18	0	0	8
19	0	0	8
20	0	3	5
21 (End)	0	5	0
Totals	140	140	0


Block 3105: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops


Block 3105: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops

Block 3106

Existing Service Characteristics

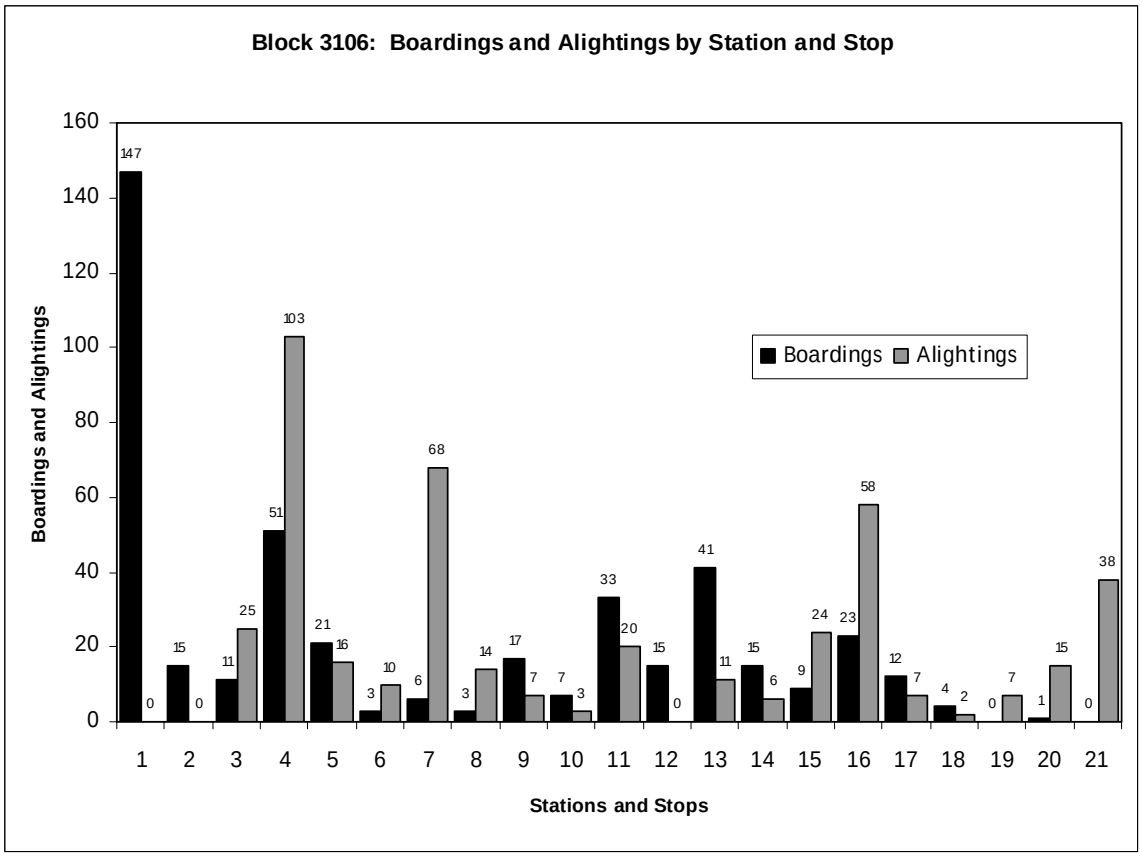
Block 3106 operates for 7 hours and 59 minutes from 6:45 AM to 2:44 PM and consists of 23 round trips. It serves both the morning and lunch peak periods.

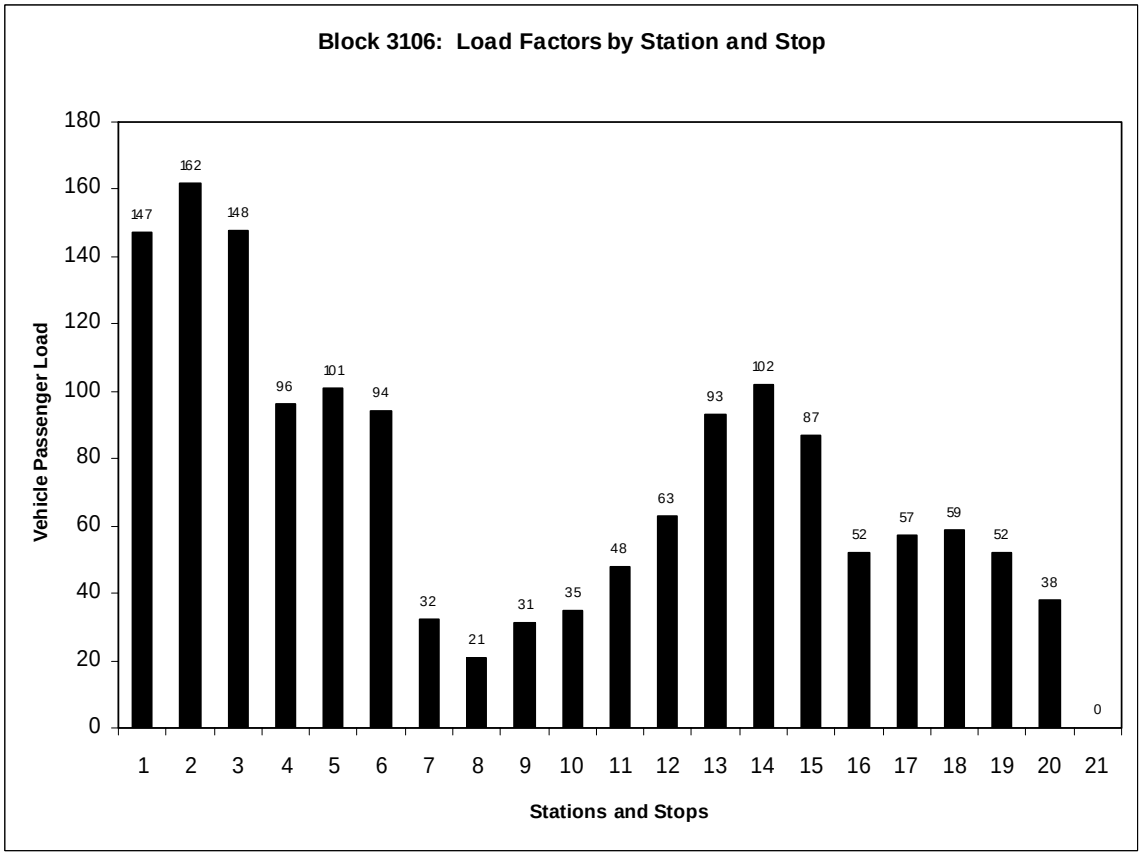
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3106. The ridecheck data show that there were 434 total boardings and alightings. The ridecheck data show that most boardings occurred at the Centroplex Garage with 147 and the most alightings occurred at the Orange County Courthouse with 103. Exhibit 20 shows the boardings and alightings by stop and station for Block 3106. Using the ridecheck data, the following measures were computed for Block 3106: there are approximately 54.4 passengers per in-service hour and 6.3 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3106.

Exhibit 20: Customer Boardings and Alightings for LYMMO Block 3106

Stop and Station Number	Block 3106		
	Boardings	Alightings	Load
1 (Start)	147	0	147
2	15	0	162
3	11	25	148
4	51	103	96
5	21	16	101
6	3	10	94
7	6	68	32
8	3	14	21
9	17	7	31
10	7	3	35
11	33	20	48
12	15	0	63
13	41	11	93
14	15	6	102
15	9	24	87
16	23	58	52
17	12	7	57
18	4	2	59
19	0	7	52
20	1	15	38
21 (End)	0	38	0
Totals	434	434	0


Block 3106: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
147 0 15 0 11 25 51 103 21 16 3 10 6 68 3 14 17 7 7 3 33 20 15 0 41 11 15 6 9 24 23 58 12 7 4 2 0 7 1 15 0 38


Block 3106: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
180
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
147 162 148 96 101 94 32 21 31 35 48 63 93 102 87 52 57 59 52 38 0

Block 3107

Existing Service Characteristics

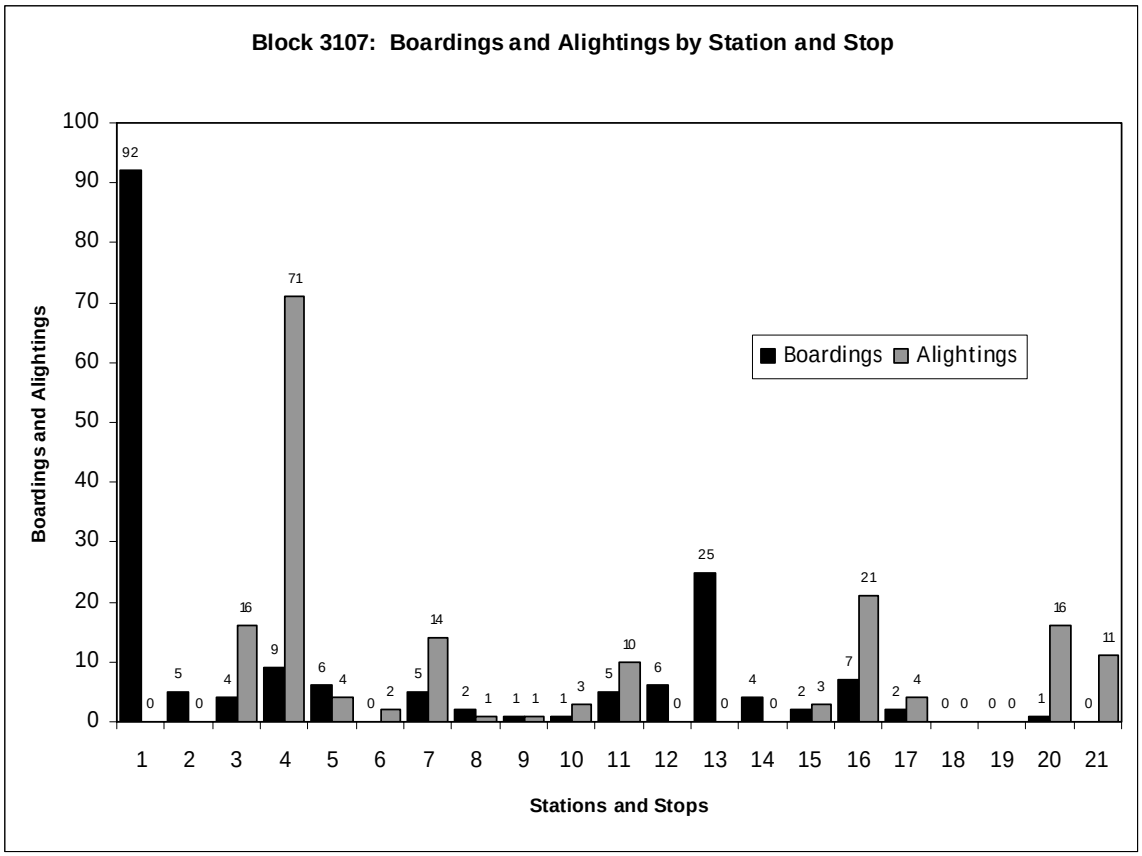
Block 3107 operates for 3 hours and 38 minutes from 7:06 AM to 10:44 AM and consists of 10 round trips. It serves the morning peak period.

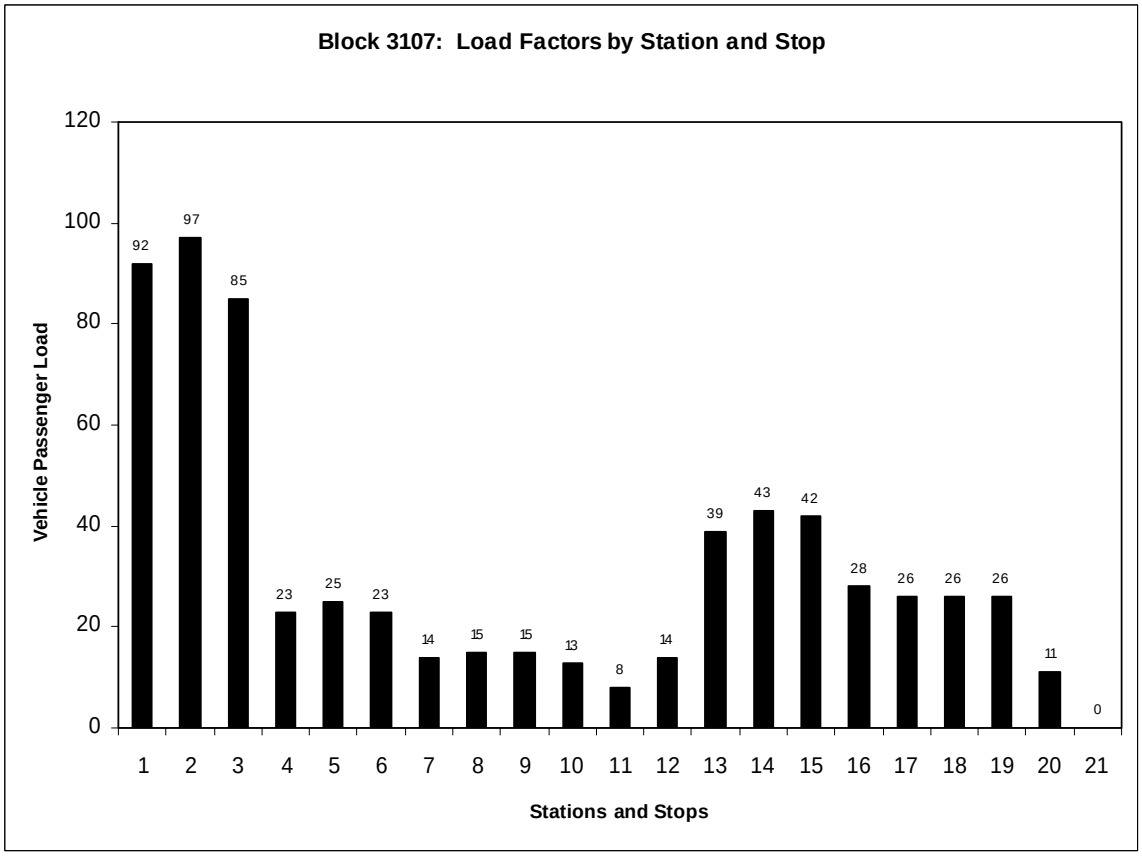
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3107. The ridecheck data show that there were 177 total boardings and alightings. The ridecheck data show that most boardings occurred at the Centroplex Garage with 92 and the most alightings occurred at the Orange County Courthouse with 71. Exhibit 21 shows the boardings and alightings by stop and station for Block 3107. Using the ridecheck data, the following measures were computed for Block 3107: there are approximately 48.7 passengers per in-service hour and 5.7 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3107.

Exhibit 21: Customer Boardings and Alightings for LYMMO Block 3107

Stop and Station Number	Block 3107		
	Boardings	Alightings	Load
1 (Start)	92	0	92
2	5	0	97
3	4	16	85
4	9	71	23
5	6	4	25
6	0	2	23
7	5	14	14
8	2	1	15
9	1	1	15
10	1	3	13
11	5	10	8
12	6	0	14
13	25	0	39
14	4	0	43
15	2	3	42
16	7	21	28
17	2	4	26
18	0	0	26
19	0	0	26
20	1	16	11
21 (End)	0	11	0
Totals	177	177	0


Block 3107: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
92 0 5 0 4 16 9 71 6 4 0 2 5 14 2 1 1 1 1 3 5 10 6 0 25 0 4 0 2 3 7 21 2 4 0 0 0 0 1 16 0 11


Block 3107: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
92 97 85 23 25 23 14 15 15 13 8 14 39 43 42 28 26 26 26 11 0

Block 3108

Existing Service Characteristics

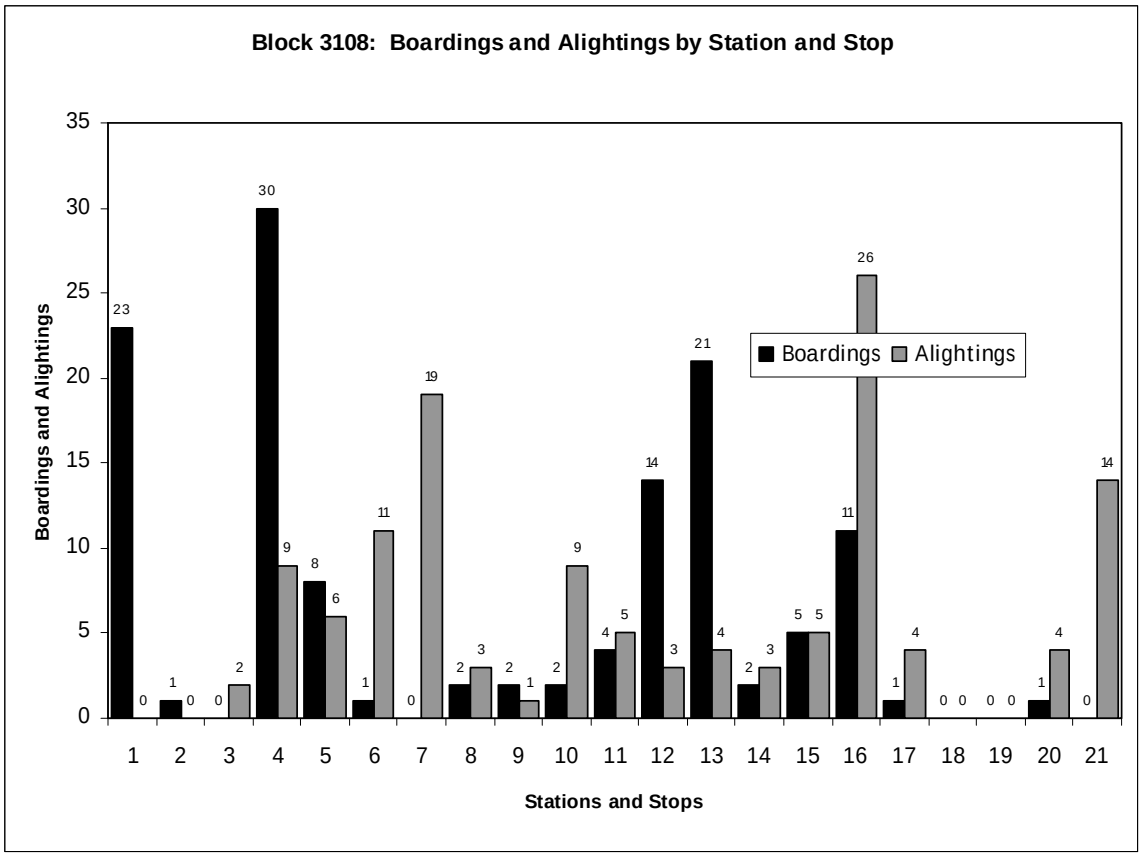
Block 3108 operates for 4 hours and 34 minutes from 9:55 AM to 2:29 PM and consists of 13 round trips. It mainly serves lunch peak period.

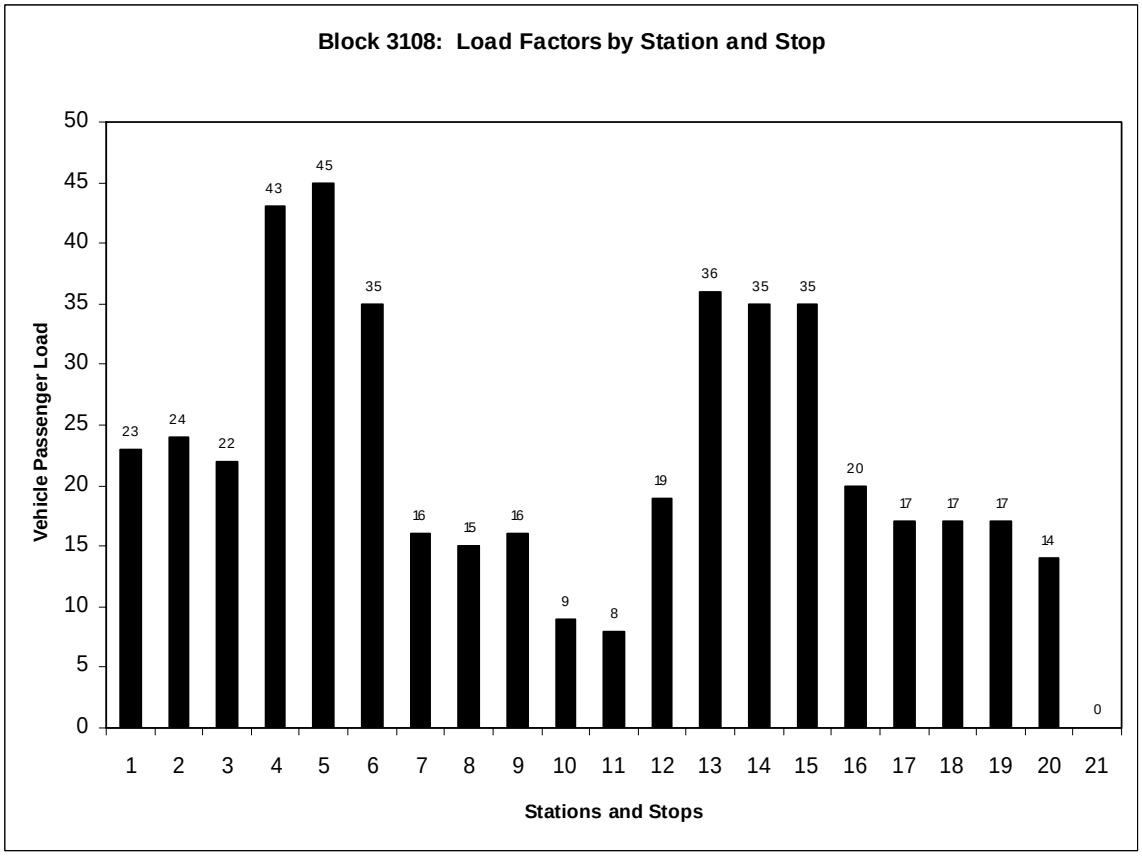
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3108. The ridecheck data show that there were 128 total boardings and alightings. The ridecheck data show that most boardings occurred at the Orange County Courthouse with 30 and the most alightings occurred at the Livingston Avenue and Orange Avenue station with 26. Exhibit 22 shows the boardings and alightings by stop and station for Block 3108. Using the ridecheck data, the following measures were computed for Block 3108: there are approximately 28.0 passengers per in-service hour and 3.3 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3108.

Exhibit 22: Customer Boardings and Alightings for LYMMO Block 3108

Stop and Station Number	Block 3108		
	Boardings	Alightings	Load
1 (Start)	23	0	23
2	1	0	24
3	0	2	22
4	30	9	43
5	8	6	45
6	1	11	35
7	0	19	16
8	2	3	15
9	2	1	16
10	2	9	9
11	4	5	8
12	14	3	19
13	21	4	36
14	2	3	35
15	5	5	35
16	11	26	20
17	1	4	17
18	0	0	17
19	0	0	17
20	1	4	14
21 (End)	0	14	0
Totals	128	128	0


Block 3108: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops


Block 3108: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops

Block 3109

Existing Service Characteristics

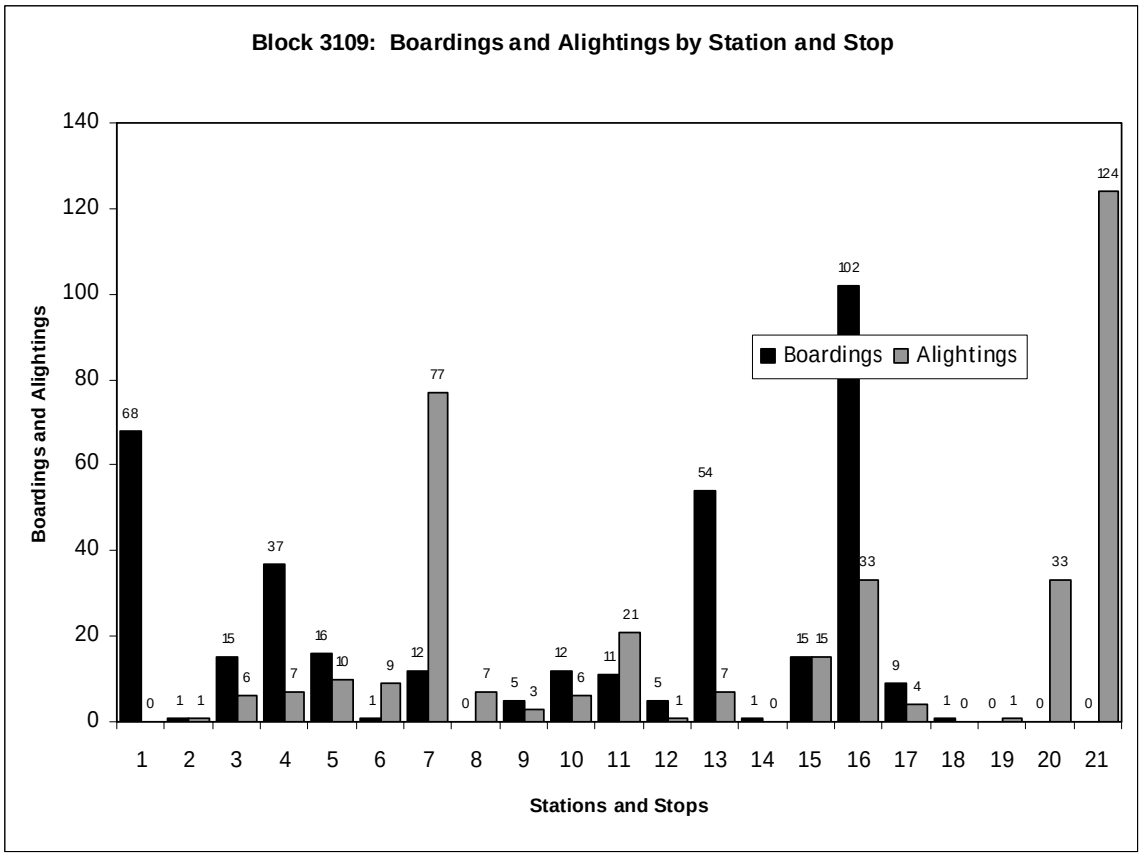
Block 3109 operates for 7 hours and 52 minutes from 10:30 AM to 6:22 PM and consists of 22 round trips. It mainly serves both the lunch and afternoon peak periods.

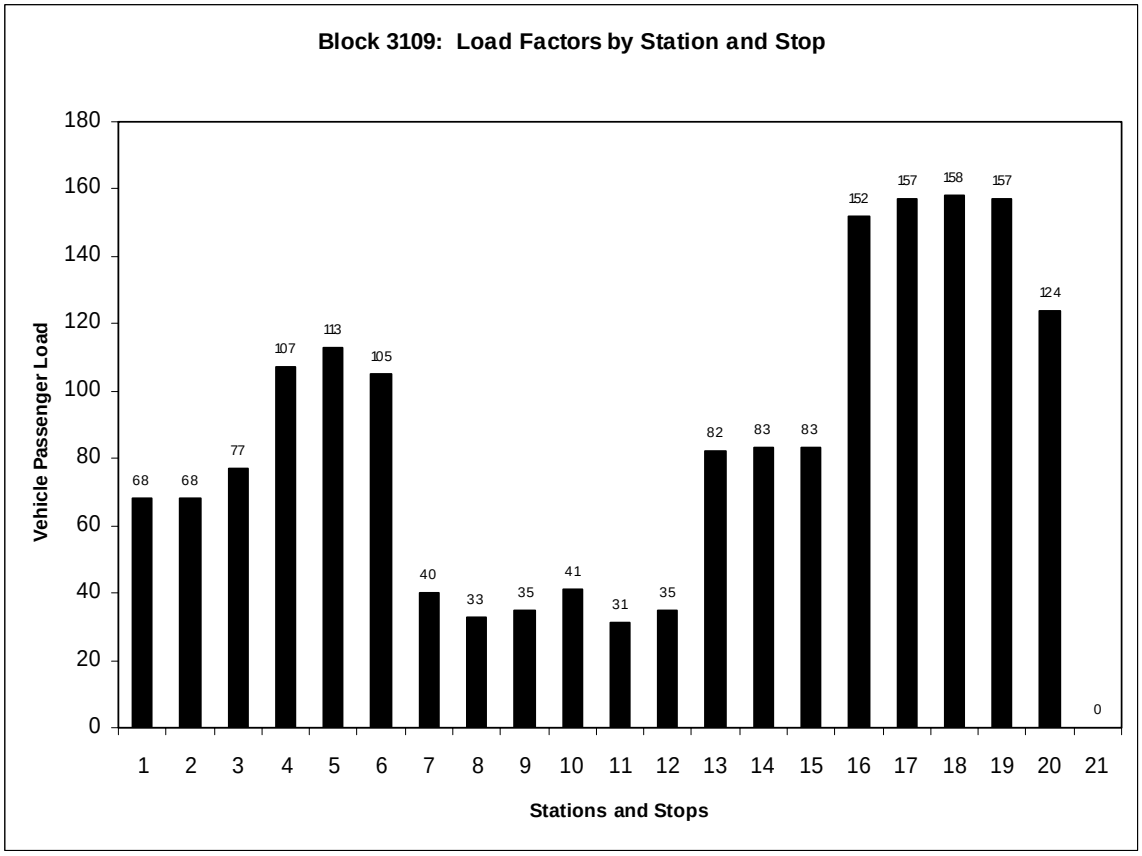
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3109. The ridecheck data show that there were 365 total boardings and alightings. The ridecheck data show that most boardings occurred at the Orange County Courthouse with 102 and the most alightings occurred at the Centroplex Garage with 124. Exhibit 23 shows the boardings and alightings by stop and station for Block 3109. Using the ridecheck data, the following measures were computed for Block 3109: there are approximately 46.4 passengers per in-service hour and 5.4 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3109.

Exhibit 23: Customer Boardings and Alightings for LYMMO Block 3109

Stop and Station Number	Block 3109		
	Boardings	Alightings	Load
1 (Start)	68	0	68
2	1	1	68
3	15	6	77
4	37	7	107
5	16	10	113
6	1	9	105
7	12	77	40
8	0	7	33
9	5	3	35
10	12	6	41
11	11	21	31
12	5	1	35
13	54	7	82
14	1	0	83
15	15	15	83
16	102	33	152
17	9	4	157
18	1	0	158
19	0	1	157
20	0	33	124
21 (End)	0	124	0
Totals	365	365	0


Block 3109: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
68 0 1 1 15 6 37 7 16 10 1 9 12 77 0 7 5 3 12 6 11 21 5 1 54 7 1 0 15 15 102 33 9 4 1 0 0 1 0 33 0 124
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
0 20 40 60 80 100 120 140


Block 3109: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
68 68 77 107 113 105 40 33 35 41 31 35 82 83 83 152 157 158 157 124 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
0 20 40 60 80 100 120 140 160 180

Block 3110

Existing Service Characteristics

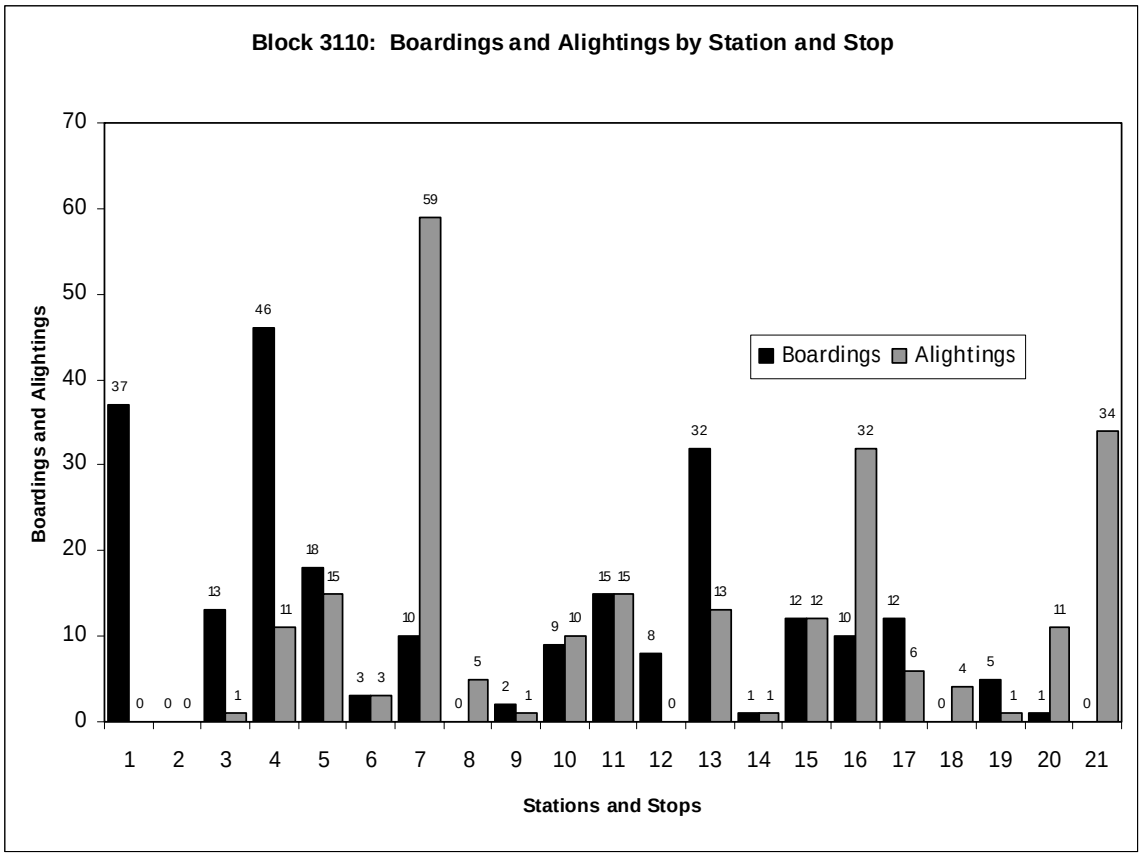
Block 3110 operates for 4 hours and 7 minutes from 11:02 AM to 3:09 PM and consists of 12 round trips. It mainly serves the lunch peak period.

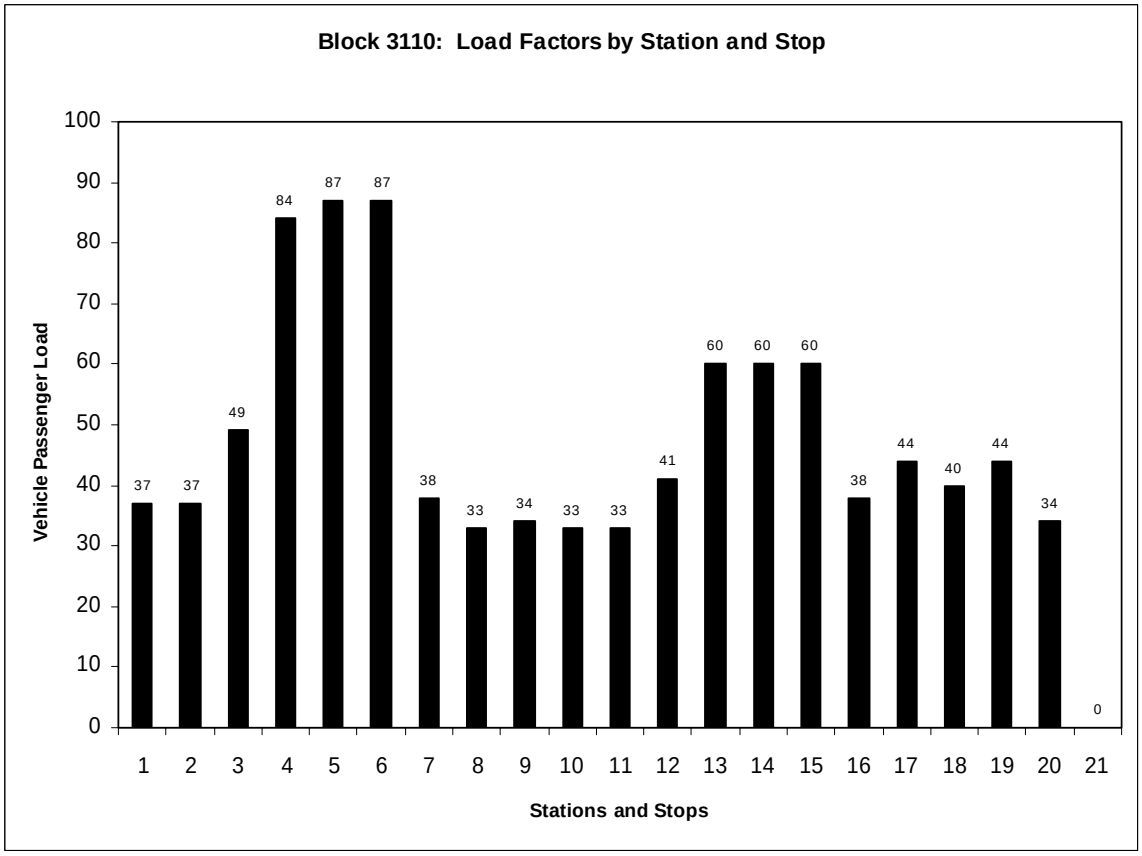
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3110. The ridecheck data show that there were 234 total boardings and alightings. The ridecheck data show that most boardings occurred at the Orange County Courthouse with 46 and the most alightings occurred at Magnolia Avenue and Central Avenue station with 59. Exhibit 24 shows the boardings and alightings by stop and station for Block 3110. Using the ridecheck data, the following measures were computed for Block 3110: there are approximately 56.8 passengers per in-service hour and 6.6 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3110.

Exhibit 24: Customer Boardings and Alightings for LYMMO Block 3110

Stop and Station Number	Block 3110		
	Boardings	Alightings	Load
1 (Start)	37	0	37
2	0	0	37
3	13	1	49
4	46	11	84
5	18	15	87
6	3	3	87
7	10	59	38
8	0	5	33
9	2	1	34
10	9	10	33
11	15	15	33
12	8	0	41
13	32	13	60
14	1	1	60
15	12	12	60
16	10	32	38
17	12	6	44
18	0	4	40
19	5	1	44
20	1	11	34
21 (End)	0	34	0
Totals	234	234	0


Block 3110: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
0
10
20
30
40
50
60
70
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
37 0 0 0 13 1 46 11 18 15 3 3 10 59 0 5 2 1 9 10 15 15 8 0 32 13 1 1 12 12 10 32 12 6 0 4 5 1 1 11 0 34


Block 3110: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
0
10
20
30
40
50
60
70
80
90
100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
37 37 49 84 87 87 38 33 34 33 33 41 60 60 60 38 44 40 44 34 0

Block 3111

Existing Service Characteristics

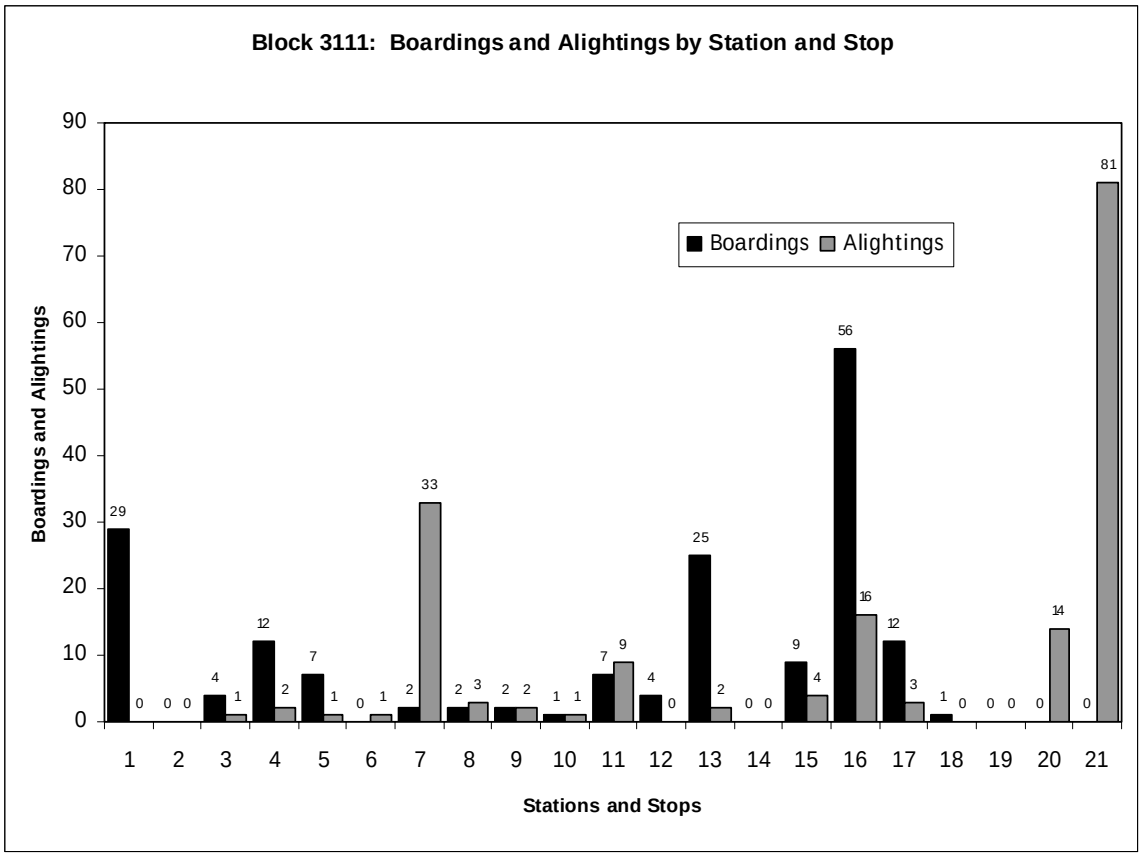
Block 3111 operates for 4 hours and 7 minutes from 2:05 PM to 6:12 PM and consists of 12 round trips. It mainly serves the afternoon peak period.

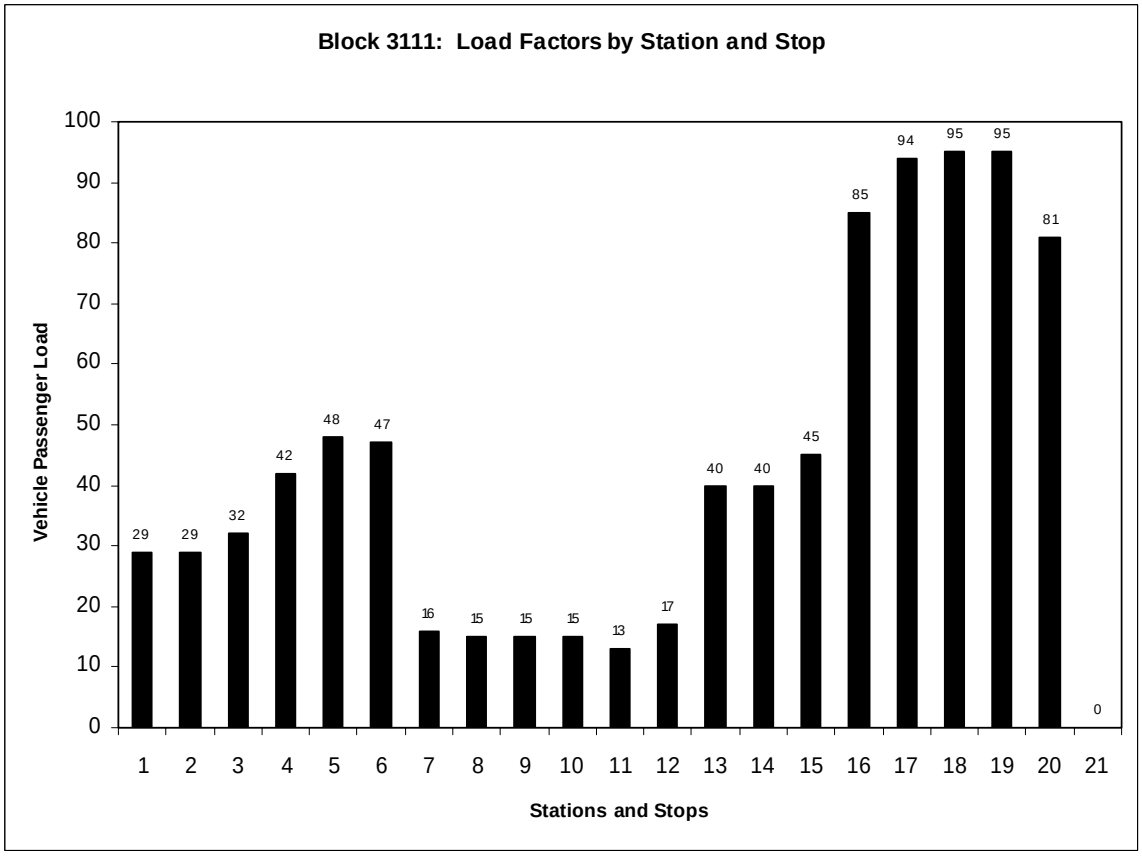
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3111. The ridecheck data show that there were 173 total boardings and alightings. The ridecheck data show that most boardings occurred at the Orange County Courthouse with 56 and the most alightings occurred at Centroplex Garage with 81. Exhibit 25 shows the boardings and alightings by stop and station for Block 3111. Using the ridecheck data, the following measures were computed for Block 3111: there are approximately 42.0 passengers per in-service hour and 4.9 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3111.

Exhibit 25: Customer Boardings and Alightings for LYMMO Block 3111

Stop and Station Number	Block 3111		
	Boardings	Alightings	Load
1 (Start)	29	0	29
2	0	0	29
3	4	1	32
4	12	2	42
5	7	1	48
6	0	1	47
7	2	33	16
8	2	3	15
9	2	2	15
10	1	1	15
11	7	9	13
12	4	0	17
13	25	2	40
14	0	0	40
15	9	4	45
16	56	16	85
17	12	3	94
18	1	0	95
19	0	0	95
20	0	14	81
21 (End)	0	81	0
Totals	173	173	0


Block 3111: Boardings and Alightings by Station and Stop
Boardings
Alightings
Boardings and Alightings
Stations and Stops
0
10
20
30
40
50
60
70
80
90
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
29 0 0 0 4 1 12 2 7 1 0 1 2 33 2 3 2 2 1 1 7 9 4 0 25 2 0 0 9 4 56 16 12 3 1 0 0 0 0 14 0 81


Block 3111: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
0
10
20
30
40
50
60
70
80
90
100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
29 29 32 42 48 47 16 15 15 15 13 17 40 40 45 85 94 95 95 81 0

Block 3112

Existing Service Characteristics

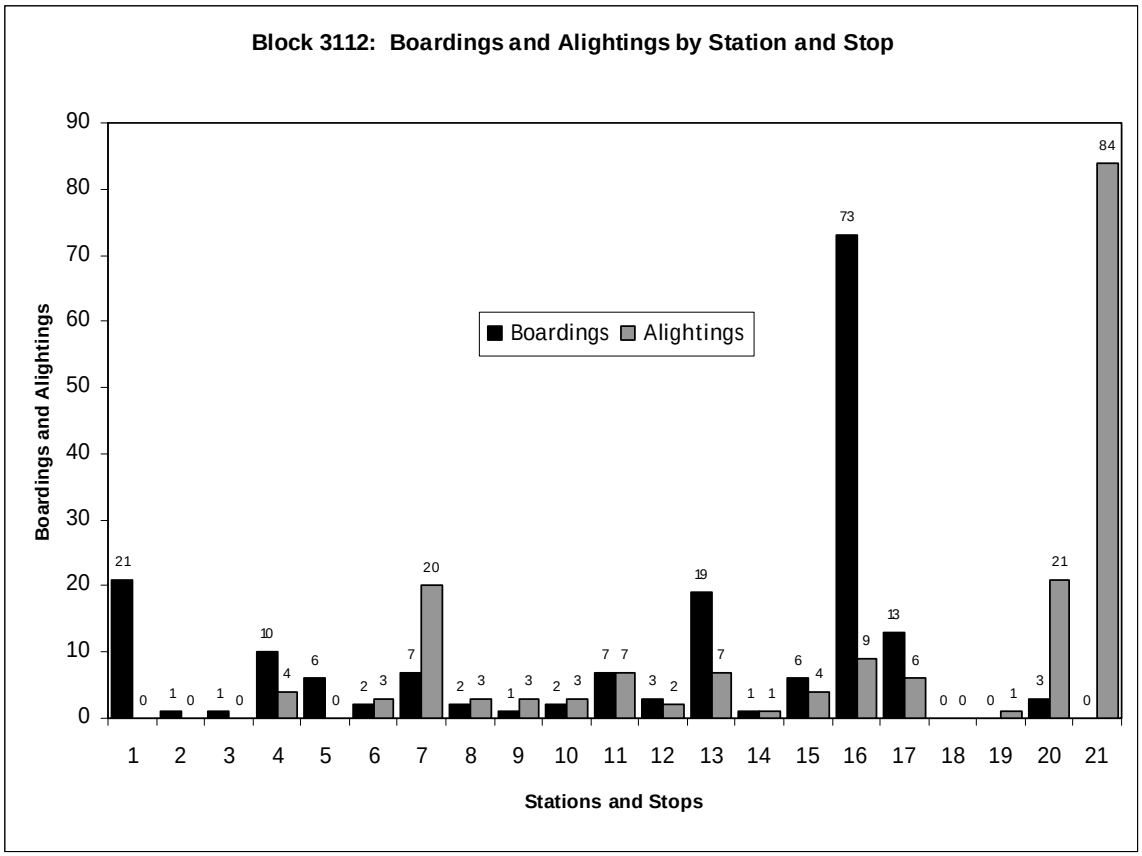
Block 3112 operates for 8 hours and 1 minute from 2:10 PM to 10:11 PM and consists of 23 round trips. It mainly serves the afternoon peak period and evening service.

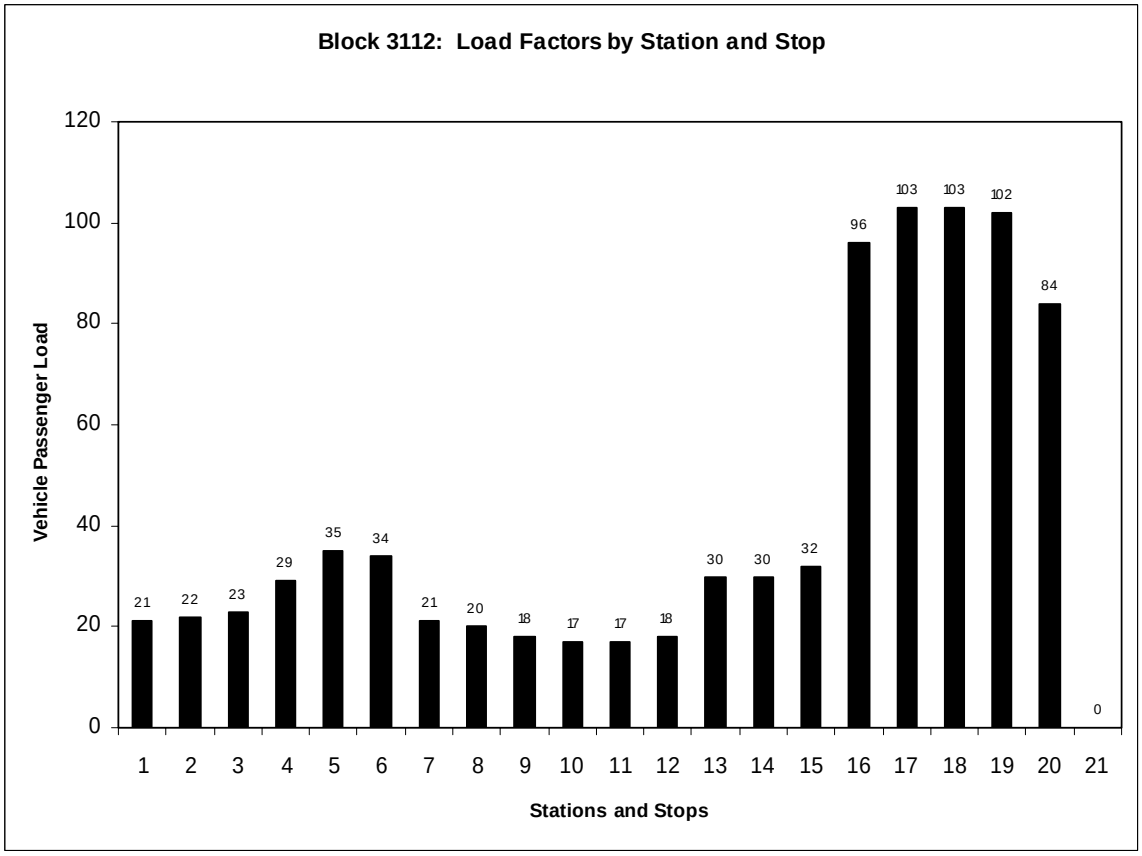
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3112. The ridecheck data show that there were 178 total boardings and alightings. The ridecheck data show that most boardings occurred at the Orange County Courthouse with 73 and the most alightings occurred at Centroplex Garage with 84. Exhibit 26 shows the boardings and alightings by stop and station for Block 3112. Using the ridecheck data, the following measures were computed for Block 3112: there are approximately 22.2 passengers per in-service hour and 2.6 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3112.

Exhibit 26: Customer Boardings and Alightings for LYMMO Block 3112

Stop and Station Number	Block 3112		
	Boardings	Alightings	Load
1 (Start)	21	0	21
2	1	0	22
3	1	0	23
4	10	4	29
5	6	0	35
6	2	3	34
7	7	20	21
8	2	3	20
9	1	3	18
10	2	3	17
11	7	7	17
12	3	2	18
13	19	7	30
14	1	1	30
15	6	4	32
16	73	9	96
17	13	6	103
18	0	0	103
19	0	1	102
20	3	21	84
21 (End)	0	84	0
Totals	178	178	0


Block 3112: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
0
10
20
30
40
50
60
70
80
90
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
21 0 1 0 1 0 10 4 6 0 2 3 7 20 2 3 1 3 2 3 7 7 3 2 19 7 1 1 6 4 73 9 13 6 0 0 0 1 3 21 0 84


Block 3112: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
0
20
40
60
80
100
120
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
21 22 23 29 35 34 21 20 18 17 17 18 30 30 32 96 103 103 102 84 0

Block 3113

Existing Service Characteristics

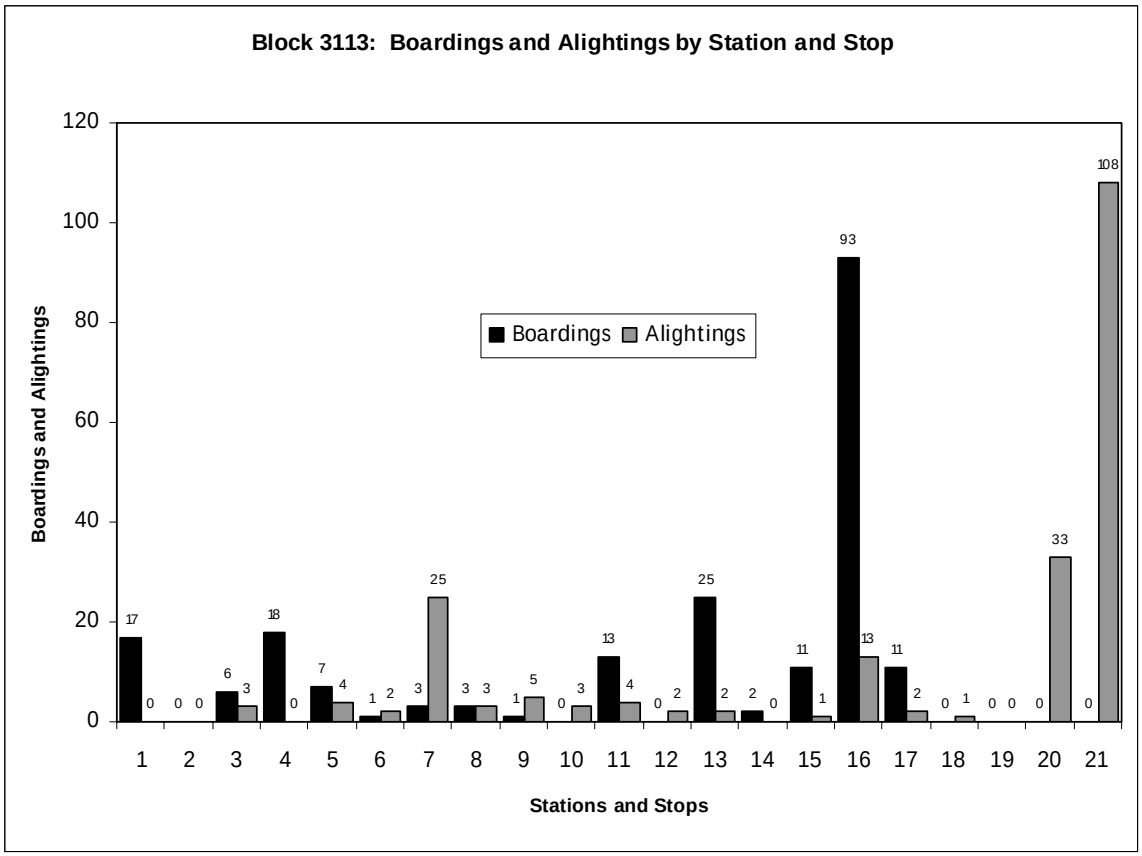
Block 3113 operates for 4 hours and 4 minutes from 2:15 PM to 6:19 PM and consists of 12 round trips. It mainly serves the afternoon peak period.

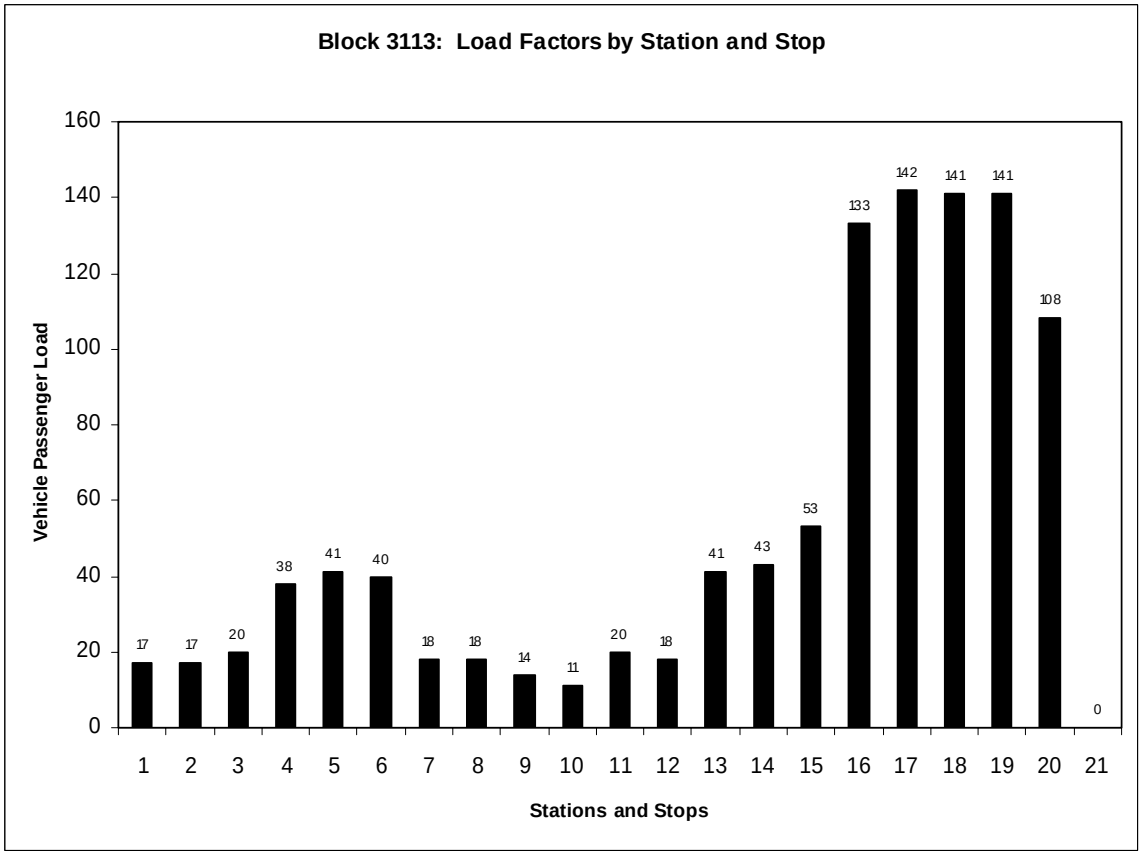
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3113. The ridecheck data show that there were 211 total boardings and alightings. The ridecheck data show that most boardings occurred at the Orange County Courthouse with 93 and the most alightings occurred at Centroplex Garage with 108. Exhibit 27 shows the boardings and alightings by stop and station for Block 3113. Using the ridecheck data, the following measures were computed for Block 3113: there are approximately 51.9 passengers per in-service hour and 6.1 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3113.

Exhibit 27: Customer Boardings and Alightings for LYMMO Block 3113

Stop and Station Number	Block 3113		
	Boardings	Alightings	Load
1 (Start)	17	0	17
2	0	0	17
3	6	3	20
4	18	0	38
5	7	4	41
6	1	2	40
7	3	25	18
8	3	3	18
9	1	5	14
10	0	3	11
11	13	4	20
12	0	2	18
13	25	2	41
14	2	0	43
15	11	1	53
16	93	13	133
17	11	2	142
18	0	1	141
19	0	0	141
20	0	33	108
21 (End)	0	108	2
Totals	211	211	0


Block 3113: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
17 0 0 0 6 3 18 0 7 4 1 2 3 25 3 3 1 5 0 3 13 4 0 2 25 2 2 0 11 1 93 13 11 2 0 1 0 0 0 33 0 108


Block 3113: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
17 17 20 38 41 40 18 18 14 11 20 18 41 43 53 133 142 141 141 108 0

Block 3114

Existing Service Characteristics

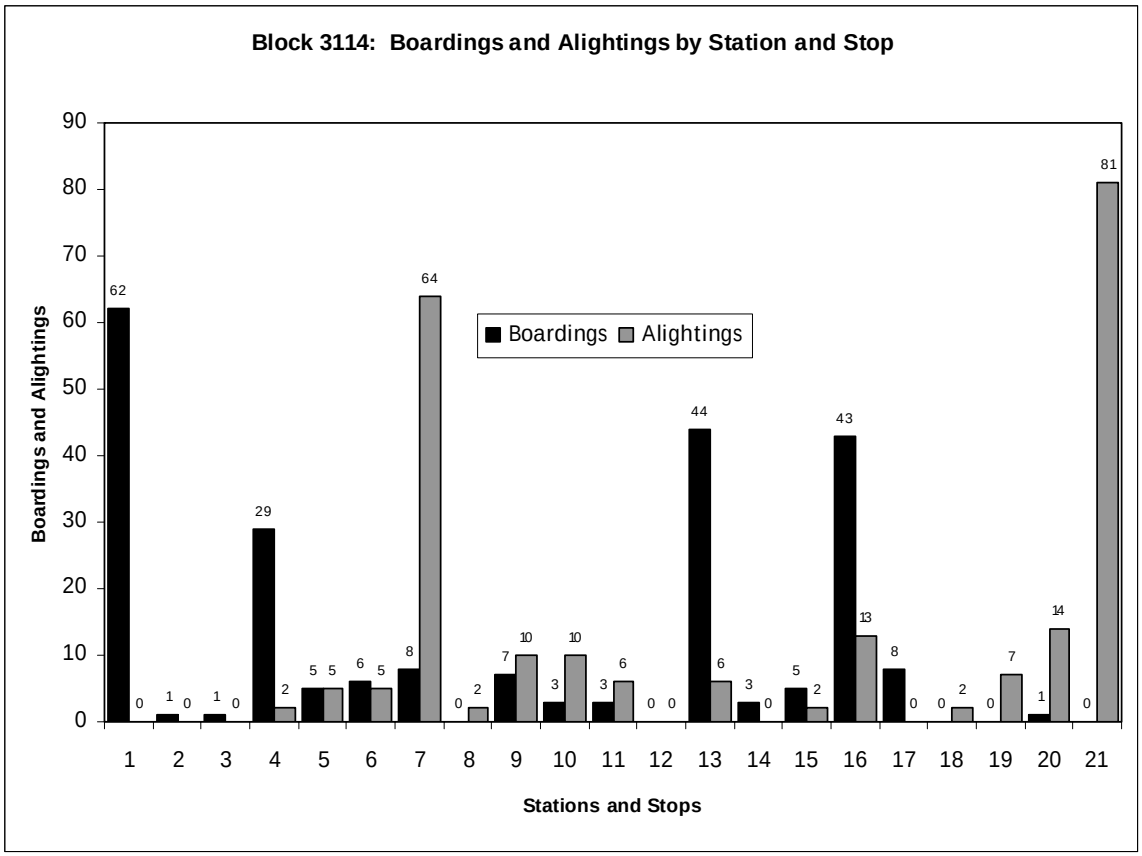
Block 3114 operates for 8 hours and 1 minute from 2:30 PM to 10:31 PM and consists of 23 round trips. It mainly serves the afternoon peak period and evening service.

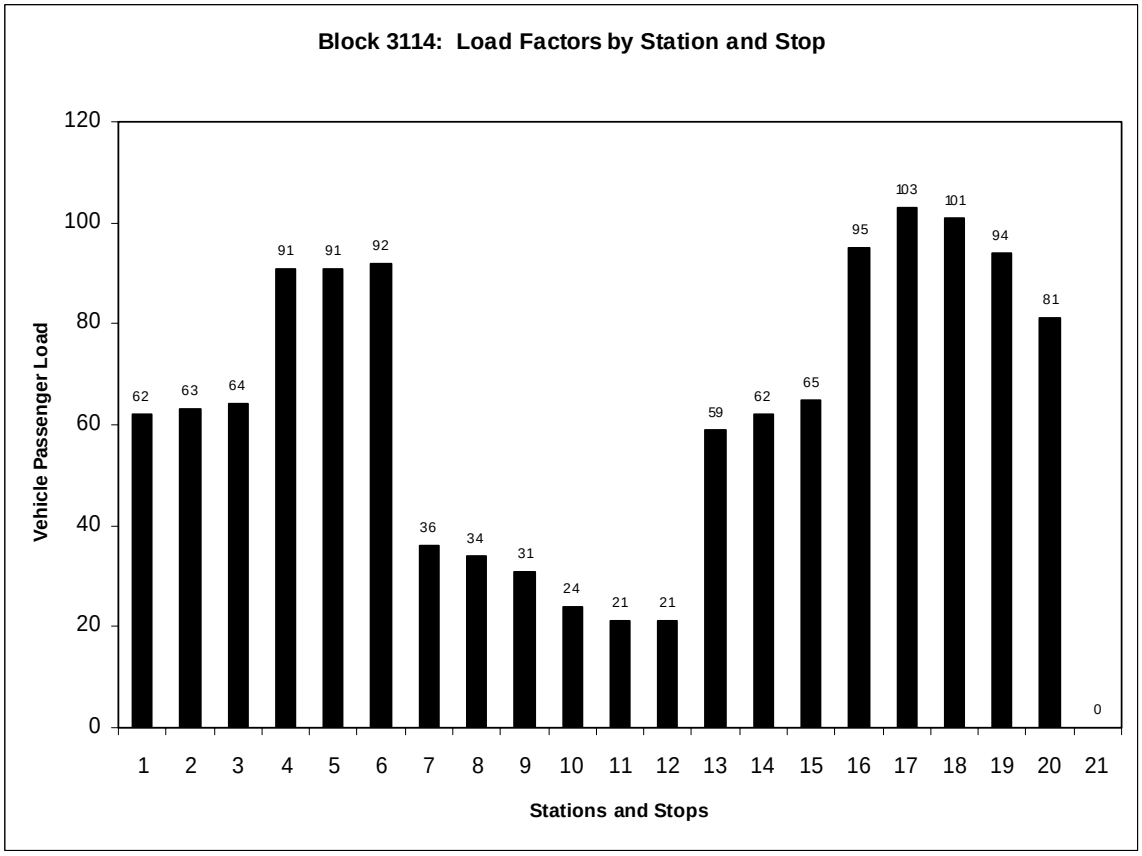
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3114. The ridecheck data show that there were 229 total boardings and alightings. The ridecheck data show that most boardings and alightings occurred at the Centroplex Garage with 62 and 81, respectively. Exhibit 28 shows the boardings and alightings by stop and station for Block 3114. Using the ridecheck data, the following measures were computed for Block 3114: there are approximately 28.6 passengers per in-service hour and 3.3 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3114.

Exhibit 28: Customer Boardings and Alightings for LYMMO Block 3114

Stop and Station Number	Block 3114		
	Boardings	Alightings	Load
1 (Start)	62	0	62
2	1	0	63
3	1	0	64
4	29	2	91
5	5	5	91
6	6	5	92
7	8	64	36
8	0	2	34
9	7	10	31
10	3	10	24
11	3	6	21
12	0	0	21
13	44	6	59
14	3	0	62
15	5	2	65
16	43	13	95
17	8	0	103
18	0	2	101
19	0	7	94
20	1	14	81
21 (End)	0	81	0
Totals	229	229	0


Block 3114: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
0
10
20
30
40
50
60
70
80
90
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
62 0 1 0 1 0 29 2 5 5 6 5 8 64 0 2 7 10 3 10 3 6 0 0 44 6 3 0 5 2 43 13 8 0 0 2 0 7 1 14 0 81


Block 3114: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
0
20
40
60
80
100
120
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
62 63 64 91 91 92 36 34 31 24 21 21 59 62 65 95 103 101 94 81 0

Block 3115

Existing Service Characteristics

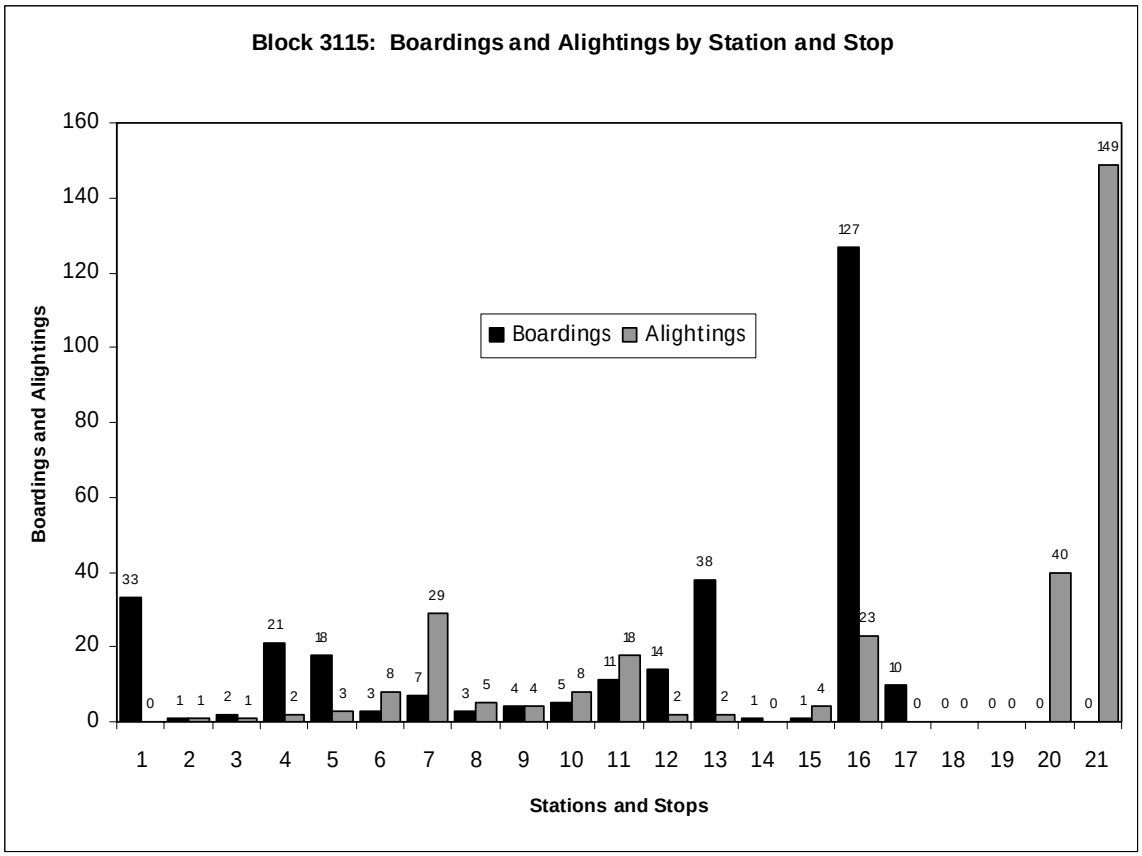
Block 3115 operates for 7 hours and 26 minutes from 2:55 PM to 10:21 PM and consists of 21 round trips. It mainly serves the afternoon peak period and evening service.

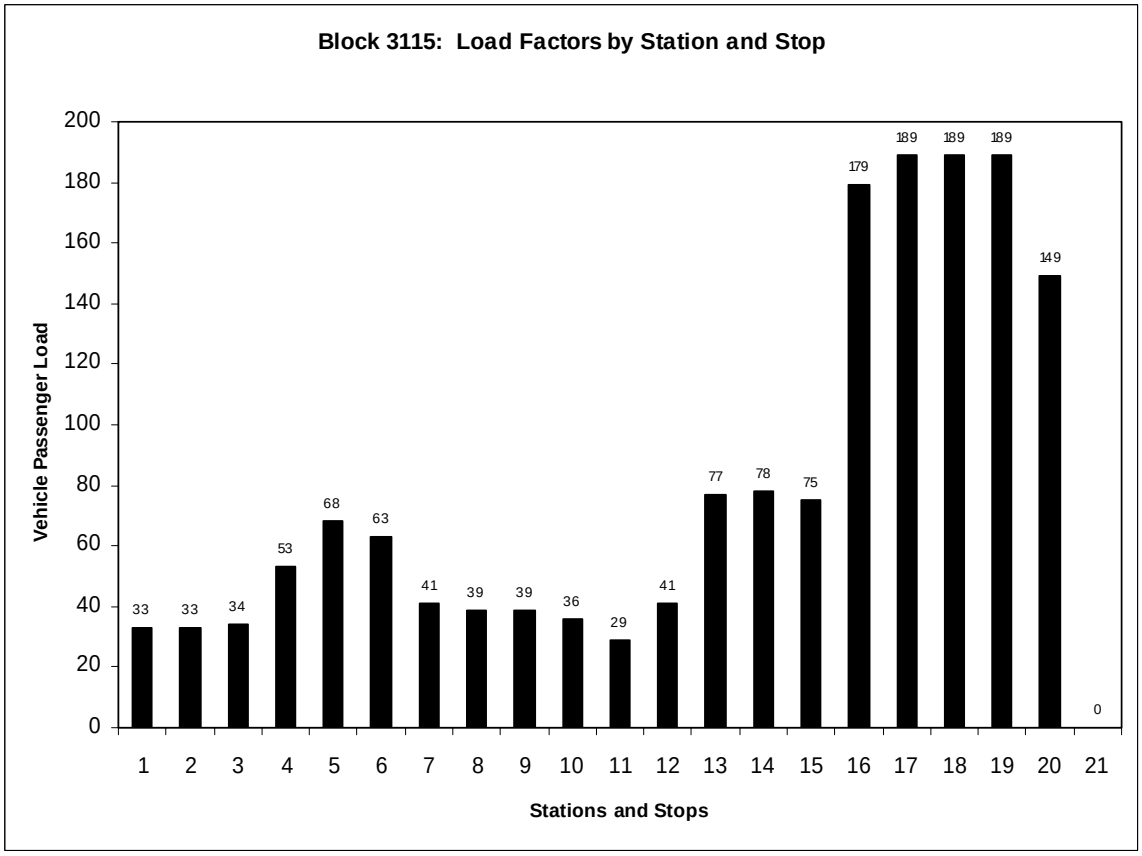
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3115. The ridecheck data show that there were 299 total boardings and alightings. The ridecheck data show that most boardings occurred at the Orange County Courthouse with 127 and the most alightings occurred at Centroplex Garage with 149. Exhibit 29 shows the boardings and alightings by stop and station for Block 3115. Using the ridecheck data, the following measures were computed for Block 3115: there are approximately 40.2 passengers per in-service hour and 4.7 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3115.

Exhibit 29: Customer Boardings and Alightings for LYMMO Block 3115

Stop and Station Number	Block 3115		
	Boardings	Alightings	Load
1 (Start)	33	0	33
2	1	1	33
3	2	1	34
4	21	2	53
5	18	3	68
6	3	8	63
7	7	29	41
8	3	5	39
9	4	4	39
10	5	8	36
11	11	18	29
12	14	2	41
13	38	2	77
14	1	0	78
15	1	4	75
16	127	23	179
17	10	0	189
18	0	0	189
19	0	0	189
20	0	40	149
21 (End)	0	149	0
Totals	299	299	0


Block 3115: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops


Block 3115: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops

Block 3116

Existing Service Characteristics

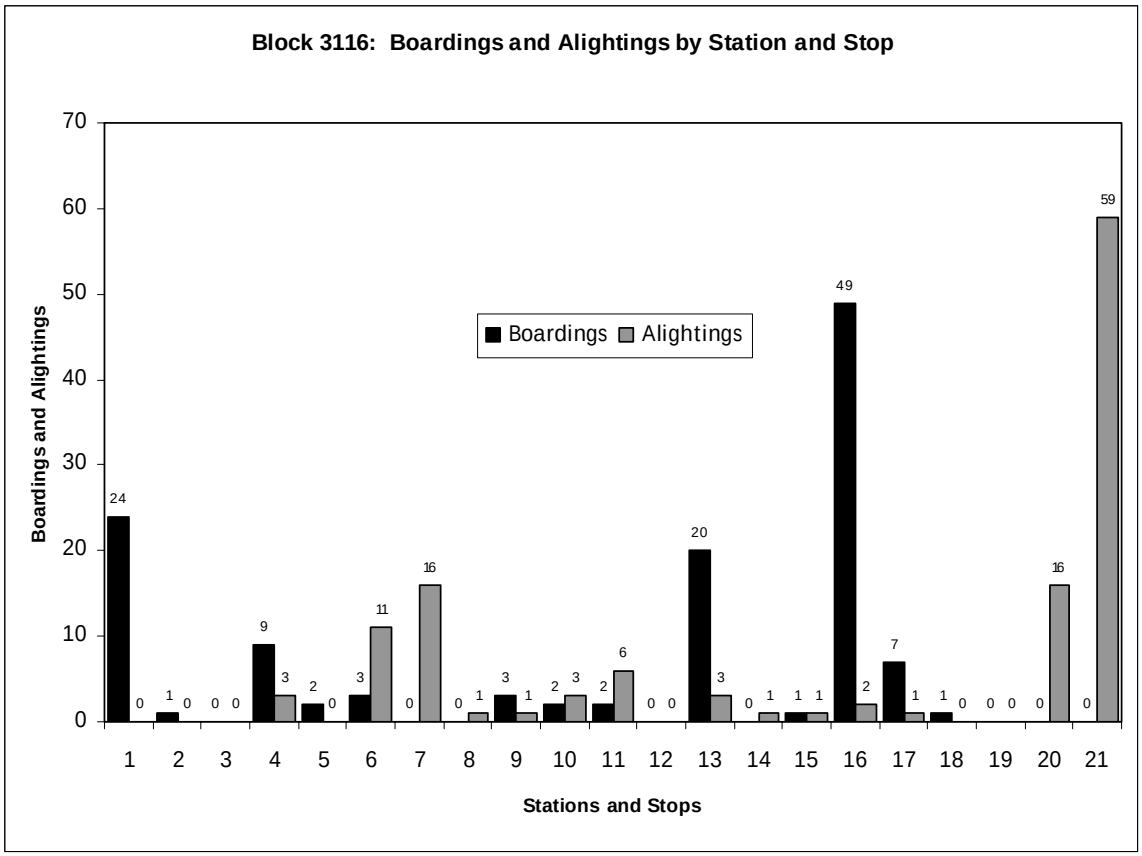
Block 3116 operates for 3 hours and 32 minutes from 3:32 PM to 6:08 PM and consists of 7 round trips. It mainly serves the afternoon peak period.

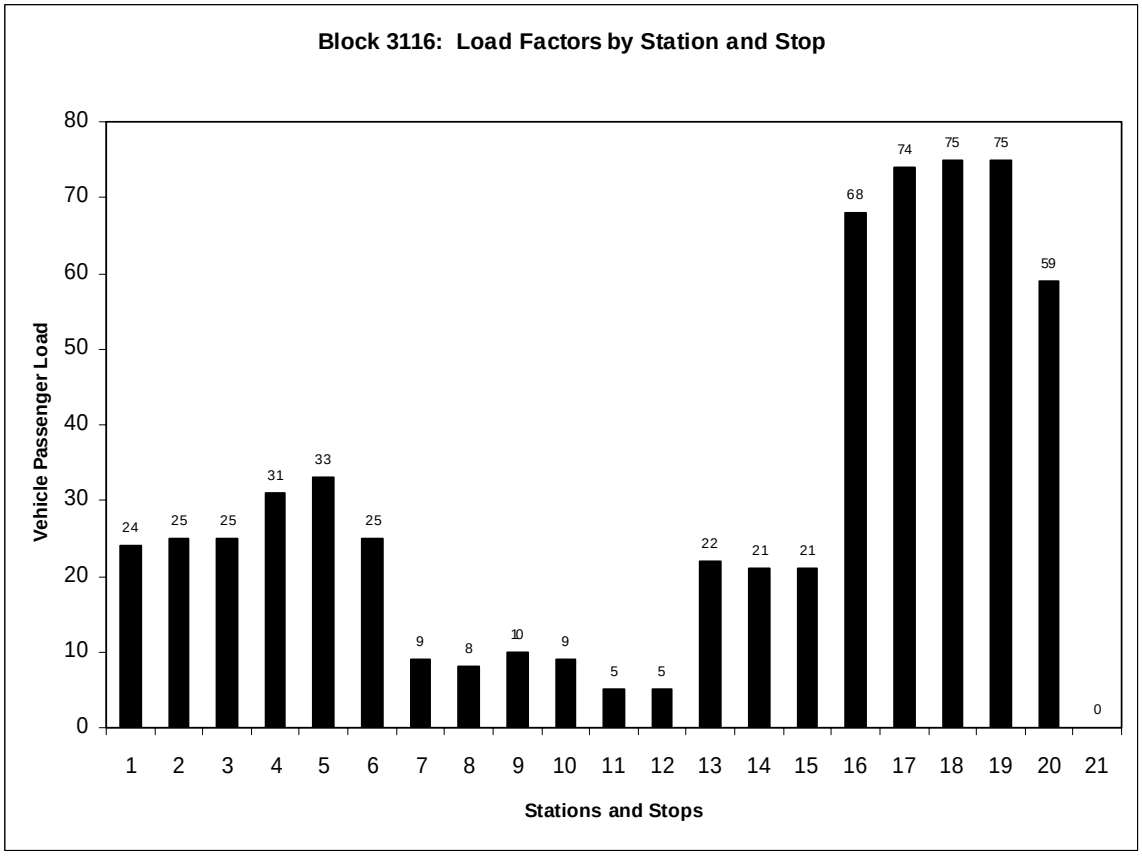
Service Analysis

Utilizing ridecheck data, daily boardings and alightings were logged by stop and station for Block 3116. The ridecheck data show that there were 124 total boardings and alightings. The ridecheck data show that most boardings occurred at the Orange County Courthouse with 49 and the most alightings occurred at Centroplex Garage with 59. Exhibit 30 shows the boardings and alightings by stop and station for Block 3116. Using the ridecheck data, the following measures were computed for Block 3116: there are approximately 47.7 passengers per in-service hour and 5.6 passengers per in-service mile. According to the observations made by ridecheckers, bunching was not a problem for Block 3116.

Exhibit 30: Customer Boardings and Alightings for LYMMO Block 3116

Stop and Station Number	Block 3116		
	Boardings	Alightings	Load
1 (Start)	24	0	24
2	1	0	25
3	0	0	25
4	9	3	31
5	2	0	33
6	3	11	25
7	0	16	9
8	0	1	8
9	3	1	10
10	2	3	9
11	2	6	5
12	0	0	5
13	20	3	22
14	0	1	21
15	1	1	21
16	49	2	68
17	7	1	74
18	1	0	75
19	0	0	75
20	0	16	59
21 (End)	0	59	0
Totals	124	124	0


Block 3116: Boardings and Alightings by Station and Stop
Boardings and Alightings
Boardings
Alightings
Stations and Stops
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
24 0 1 0 0 0 9 3 2 0 3 11 0 16 0 1 3 1 2 3 2 6 0 0 20 3 0 1 1 1 49 2 7 1 1 0 0 0 0 16 0 59


Block 3116: Load Factors by Station and Stop
Vehicle Passenger Load
Stations and Stops
80
70
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
24 25 25 31 33 25 9 8 10 9 5 5 22 21 21 68 74 75 75 59 0